



وزارة التعليم العالي والبحث العلمي  
جهاز الاشراف والتقويم العلمي  
دائرة ضمان الجودة والاعتماد الاكاديمي  
قسم الاعتماد

## دليل وصف البرنامج الاكاديمي والمقرر

نموذج وصف البرنامج الأكاديمي

اسم الجامعة: جامعة بغداد .....

الكلية/ المعهد: كلية ... العلوم .....

القسم العلمي: قسم ..... التحسس النائي .....

اسم البرنامج الأكاديمي او المهني: بكالوريوس ..... علوم التحسس

اسم الشهادة النهائية: بكالوريوس في علوم التحسس النائي .....

النظام الدراسي: سنوي

تاريخ اعداد الوصف: 1/10/2025

تاريخ ملء الملف: 1/10/2025

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التاريخ:

الأستاذ الدكتور  
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معاون العميد للشؤون العلمية والدراسية

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دقق الملف من قبل

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الأستاذ الدكتور  
زاهدون الخجسته  
عميد كلية العلوم

## ١. رؤية البرنامج

الارتقاء بمستوى خريجي قسم التحسس النائي للمساهمة في التطور العلمي والتقني للبلد وليكون من مصاف الأقسام التعليمية المتميزة والرائدة في التحصيل العلمي

## ٢. رسالة البرنامج

نهوض بالعملية التعليمية في التحسس لتصل إلى أعلى مرحلة من الجودة لتخريج الطلاب مؤهلين قادرين على التفكير المنطقي ويمتلكون مهارات البحث العلمي لسد احتياجات سوق العمل

## ٣. اهداف البرنامج

- تحسين نوعية التعليم لمواكبة التطور التقني القائم حالياً في الجامعات العالمية.
- تطوير الخطط الدراسية في مرحلة البكالوريوس لمواكبة التطورات العلمية ومستجدات العصر.
- تأهيل كوادر قادرة على التعامل مع التقنيات المتطورة والتغيرات الحديثة بكل فعالية ومرونة.
- الأرتقاء بالبحث العلمي في مجال التحسس النائي ودراسة المشاكل البيئية والقيام بالأبحاث العلمية لأيجاد الحلول المناسبة لها، تلبية احتياجات الأقسام الأخرى في الكلية والجامعات من المقررات الدراسية

## ٤. الاعتماد البرامجي

هل البرنامج حاصل على الاعتماد البرامجي ؟ ومن أي جهة ؟ كلا

## ٥. المؤثرات الخارجية الأخرى

هل هناك جهة راعية للبرنامج: كلا

## ٦. هيكلية البرنامج

| ملاحظات *              | النسبة المئوية | وحدة دراسية | عدد المقررات | هيكل البرنامج   |
|------------------------|----------------|-------------|--------------|-----------------|
| مقرر اساسي             | 100%           | 30          | 6            | متطلبات المؤسسة |
| المتطلبات الأساسية     | 67%            | 20          | 4            | متطلبات الكلية  |
| الدورات الاختيارية     | 33%            | 10          | 2            | متطلبات القسم   |
| المواضيع المتقدمة      | 50%            | 15          | 3            | التدريب الصيفي  |
| الخبرة العملية المطلوب | 10%            | 3           | 1            | اخرى            |

\* ممكن ان تتضمن الملاحظات فيما اذا كان المقرر أساسي او اختياري .

| ٧. وصف البرنامج       |                      |                                                         |                  |      |
|-----------------------|----------------------|---------------------------------------------------------|------------------|------|
| السنة / المستوى       | رمز المقرر او المساق | اسم المقرر او المساق                                    | الساعات المعتمدة |      |
|                       |                      |                                                         | نظري             | عملي |
| الرابعه /الفصل الاول  | RSNR401              | موار طبيعية                                             | •                |      |
| الرابعه /الفصل الاول  | RSOP403              | اختياري                                                 | •                |      |
| الرابعه /الفصل الاول  | RSWF405              | رياضيات الموجات والمجالات                               | •                |      |
| الرابعه /الفصل الاول  | RSEP407              | معالجة الملوثات البيئية                                 | •                | •    |
| الرابعه /الفصل الاول  | RSRW409              | التحسس النائي في الموارد المائية                        | •                | •    |
| الرابعه /الفصل الاول  | RSLC411              | تخطيط الغطاء الارضي                                     | •                |      |
| الرابعه /الفصل الاول  | EN413                | انكليزي 4-                                              | •                |      |
| الرابعه /الفصل الاول  | RSP415               | مشروع تخرج                                              | •                |      |
| الرابعه /الفصل الثاني | RSEA402              | تطبيقات بيئية في التحسس النائي ونظم المعلومات الجغرافية | •                | •    |
| الرابعه /الفصل الثاني | RSRG404              | الاستشعار عن بعد في علوم الارض                          | •                |      |
| الرابعه /الفصل الثاني | RSLU406              | تخطيط استعمالات الارض                                   | •                |      |
| الرابعه /الفصل الثاني | RSPL408              | تخطيط بيئي                                              | •                | •    |
| الرابعه /الفصل الثاني | RSHS410              | هيدروكيمياء                                             | •                | •    |
| الرابعه /الفصل الثاني | RSSF412              | المتحسسات المفاهيم والتطبيقات                           | •                |      |
| الرابعه /الفصل الثاني | RSST416              | تقنيات التحسس النائي                                    | •                | •    |
| الرابعه /الفصل الثاني | RSP415               | مشروع بحث التخرج                                        | •                |      |

| 8. مخرجات التعلم المتوقعة للبرنامج                                                                                                                                                                                                        |                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| المعرفة                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                    |
| <p>أ1- تطوير امكانياته في التحليل للوصول الى حلول منطقية للمسائل المختلفة</p> <p>أ2- قدرته على تقييم البرنامج الاكاديمي</p> <p>أ3- انشاء و تنظيم الجداول الاحصائية</p> <p>أ4- التعرف على الخصائص الاساسية لطبيعة المادة العلمية</p>       | <p>.المهارات والخبرات التي يكتسبها الطالب خلال خضوعه للتدريب أو خطة دراسية وتعلم بالتأكد أن المهارات المضافة إلى الطالب تكون بجهود من المعلم الذي يحدد الأهداف من كل درس، ويستخدم أساليب تحقق هذه الأهداف، فنُصقل مهارة الطالب</p> |
| المهارات                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                    |
| <p>ب 1 – القدرة على الانصات بفاعلية و المساهمة البناءة في النقاش</p> <p>ب 2 – القدرة على اتخاذ القرار و تحمل المسؤولية</p> <p>ب 3 - القدرة على الانضباط الذاتي و روح الدافعية</p> <p>ب4- القدرة على جمع المعلومات من المصادر المختلفة</p> | <p>فالطالب يتخير الأنشطة والمهام وفقا لميوله واستعداداته لتحقيق هذه الأهداف . - التعاون النشط بين الطالب وعضو هيئة التدريس في إطار اكتساب النواتج المقصودة . - التقويم الذاتي وتطوير الأداء أولا بأول في ضوء قواعد واضحة محددة</p> |
| القيم                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                    |
| <p>د 1 - تطوير قدرة الطالب على الحوار والمناقشة.</p> <p>د 2 -تنمية قدرة الطالب على التعامل مع الانترنت .</p> <p>د 3 -تنمية قدرة الطالب على التعامل مع الوسائل المتعددة .</p> <p>د 4 - تنمية قدرة الطالب على التعامل مع وسائل التقنية</p>  | <p>ان مخرجات التعلم تساعد على معرفة ما يجب أن يتعلمه الطالب وما يمكن له القيام به بعد ما يكمل البرنامج الأكاديمي املتحق به</p>                                                                                                     |

| 9. استراتيجيات التعليم والتعلم                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>استراتيجيات وطرائق التعليم والتعلم المعتمدة في تنفيذ البرنامج بشكل عام هي المحاضرات النظرية والتطبيقات العملية والتعلم التفاعلي والتعلم القائم على المشكلات ودراسة الحالات والمشاريع الفردية . والجماعية واستخدام البرمجيات المتخصصة في التحسس النائي وتظم المعلومات الجغرافية</p> |

| 10. طرائق التقييم                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>الاختبارات التحريرية والشفوية والاختبارات القصيرة والواجبات المنزلية والتقارير العلمية والتطبيقات العملية والمشاريع والعروض التقديمية والمشاركة الصفية والامتحان النهائي.</p> |

| 11. الهيئة التدريسية |         |                            |  |                                     |       |                        |
|----------------------|---------|----------------------------|--|-------------------------------------|-------|------------------------|
| اعضاء هيئة التدريس   |         |                            |  |                                     |       |                        |
| الرتبة العلمية       |         | التخصص                     |  | المتطلبات/المهارات الخاصة (ان وجدت) |       | اعداد الهيئة التدريسية |
| عام                  | خاص     |                            |  | ملاك                                | محاضر |                        |
| استاذ                | فيزياء  | التحسس النائي              |  | نعم                                 |       |                        |
| استاذ                | فلك     | معالجة صور رقمية           |  | نعم                                 |       |                        |
| استاذ                | فلك     | فلك                        |  | نعم                                 |       |                        |
| استاذ                | فيزياء  | معالجة صور رقمية           |  | نعم                                 |       |                        |
| استاذ                | فلك     | فلك                        |  | نعم                                 |       |                        |
| استاذ                | فيزياء  | تحسس نائي                  |  | نعم                                 |       |                        |
| استاذ                | فيزياء  | تحسس نائي ومعالجة<br>صورية |  | نعم                                 |       |                        |
| استاذ                | فيزياء  | فيزياء                     |  | نعم                                 |       |                        |
| استاذ مساعد          | فيزياء  | تحسس نائي                  |  | نعم                                 |       |                        |
| استاذ مساعد          | فيزياء  | معالجة صورية               |  | نعم                                 |       |                        |
| استاذ مساعد          | فلك     | معالجة صورية               |  | نعم                                 |       |                        |
| مدرس                 | فيزياء  | اغشية رقيقة                |  | نعم                                 |       |                        |
| مدرس                 | حاسوب   | حاسوب                      |  | نعم                                 |       |                        |
| مدرس                 | فلك     | فلك                        |  | نعم                                 |       |                        |
| مدرس                 | فلك     | فلك                        |  | نعم                                 |       |                        |
| مدرس                 | علوم جو | علوم جو                    |  | نعم                                 |       |                        |

|  |     |  |  |                                       |                  |               |
|--|-----|--|--|---------------------------------------|------------------|---------------|
|  | نعم |  |  | حاسبات                                | حاسبات           | مدرس          |
|  | نعم |  |  | حاسبات                                | حاسبات           | مدرس          |
|  | نعم |  |  | ميكانيك التربة                        | هندسة مدني       | مدرس          |
|  | نعم |  |  | الرياضيات<br>الصرفة                   | الرياضيات        | مدرس          |
|  | نعم |  |  | اغشية رقيقة<br>والمعالجة<br>الصورية   | فيزياء           | مدرس          |
|  | نعم |  |  | التحسس النائي<br>والمعالجة<br>الصورية | فيزياء           | مدرس          |
|  | نعم |  |  | التحسس النائي<br>والمعالجة<br>الصورية | فيزياء           | مدرس<br>مساعد |
|  | نعم |  |  | التحسس النائي<br>والمعالجة<br>الصورية | فيزياء           | مدرس<br>مساعد |
|  | نعم |  |  | التحسس النائي<br>والمعالجة<br>الصورية | فيزياء           | مدرس<br>مساعد |
|  | نعم |  |  | التحسس النائي<br>والمعالجة<br>الصورية | فيزياء           | مدرس<br>مساعد |
|  | نعم |  |  | التحسس النائي<br>والمعالجة<br>الصورية | فيزياء           | مدرس<br>مساعد |
|  | نعم |  |  | التحسس النائي<br>والمعالجة<br>الصورية | فيزياء           | مدرس<br>مساعد |
|  | نعم |  |  | اغشية رقيقة<br>ومعالجة صورية          | فيزياء           | مدرس<br>مساعد |
|  | نعم |  |  | رياضيات                               | رياضيات          | مدرس<br>مساعد |
|  | نعم |  |  | فيزياء                                | فيزياء           | مدرس<br>مساعد |
|  | نعم |  |  | التخطيط الحضري<br>والاقليمي           | تربية<br>جغرافية | مدرس<br>مساعد |
|  | نعم |  |  | فلك                                   | فلك              | مدرس<br>مساعد |
|  | نعم |  |  | حاسبات                                | حاسبات           | مدرس<br>مساعد |

|            |        |        |  |     |  |
|------------|--------|--------|--|-----|--|
| مدرس مساعد | حاسبات | حاسبات |  | نعم |  |
| مدرس مساعد | فيزياء | مواد   |  | نعم |  |

## التطوير المهني

### توجيه اعضاء هيئة التدريس الجدد

المؤسسة والقسم، تشمل الخطوات التالية:

1. الاستقبال والتعريف العام: يتم تقديم تعريف شامل عن المؤسسة، رؤيتها، رسالتها، وهيكلها التنظيمي.
2. التعريف بالقسم: يتم تقديم معلومات عن القسم، أهدافه، برامجه، وأعضاء هيئة التدريس الحاليين.
3. التدريب على السياسات والإجراءات: يتم شرح السياسات الأكاديمية، الإدارية، والإجراءات المتعلقة بالتدريس والبحث.
4. التوجيه الأكاديمي: يتم تقديم إرشادات حول المناهج، طرق التدريس، التقييم، واستخدام التقنيات التعليمية.
5. الدعم الإداري: يتم توفير معلومات عن الخدمات الإدارية، مثل شؤون الموظفين، المرافق، والموارد المتاحة.
6. التواصل والشبكات: يتم تشجيع التفاعل مع الزملاء والمشاركة في الفعاليات الأكاديمية والاجتماعية.
7. المتابعة والدعم المستمر: يتم توفير دعم مستمر من خلال مرشدين أو لجان توجيهية لضمان التكيف والنجاح في الأدوار الجديدة.

### التطوير المهني لأعضاء هيئة التدريس

في التدريس، البحث، والتطوير المهني. فيما يلي وصف موجز لهذه الخطة:

#### مشاركة الاساتذة في دورة طرائق التدريس الحديثة :-

- ادارة صف مكون من عدد كبير
- تعليم مجاميع صغيرة
- التعليم الالكتروني والتعليم المدمج

استراتيجيات التدريس والتعلم:

- ورش العمل والدورات التدريبية: تنظيم ورش عمل حول طرق التدريس الحديثة، مثل التعلم النشط، واستخدام التكنولوجيا في التعليم.
- التدريب على المناهج الجديدة: تقديم تدريب خاص عند إدخال مناهج أو برامج أكاديمية جديدة.
- التعليم التشاركي: تشجيع أعضاء هيئة التدريس على مشاركة أفضل الممارسات والخبرات مع الزملاء.

**تقييم نتائج التعلم:** تدريب على أدوات التقييم: تقديم دورات حول تصميم أدوات تقييم فعالة، مثل الاختبارات، المشاريع، والتقييمات التكوينية والختامية.مراجعة وتطوير التقييمات: مساعدة أعضاء هيئة التدريس على مراجعة وتطوير أدوات التقييم لضمان قياس نتائج التعلم بدقة.

**التطوير المهني:** برامج التطوير المستمر: توفير فرص للحصول على شهادات مهنية متقدمة أو المشاركة في مؤتمرات وندوات أكاديمية التوجيه والإرشاد: توفير مرشدين من ذوي الخبرة لتوجيه أعضاء هيئة التدريس الجدد في تطوير مسيرتهم الأكاديمية.دعم التطبيقات التعليمية: توفير الدعم الفني للبرامج والتطبيقات المستخدمة في التدريس ..

**التقييم والمتابعة:** تقييم الأداء: إجراء تقييمات دورية لأداء أعضاء هيئة التدريس وتقديم تغذية راجعة بناءة. وتحديد الاحتياجات: تحديد احتياجات التطوير من خلال استبيانات واجتماعات منتظمة مع أعضاء هيئة التدريس

## 12. معيار القبول

يشترط في الطالب المتقدم للالتحاق ببرنامج البكلوؤيوس حاصل على شهادة الاعدادية

## 13. اهم مصادر المعلومات عن البرنامج

التوجيهات المباشرة من خلال ورش العمل في قسم ضمان الجودة و الاداء الجامعي في الجامعة و الكلية و المواقع الالكترونية - المعلومات المتوفرة في استمارة الوصف بشروحاتها المرفقة من قبل الجامعة .  
للجامعات العراقية والاجنبية -ورش العمل التي اقامتها وزارة التعليم العالي بالاضافة الى معايير الوزارة

## 14. خطة تطوير البرنامج

تشمل خطة التطوير الأكاديمي والمهني ما يلي:

•ورش عمل وندوات: جلسات دورية منتظمة حول استراتيجيات التدريس الفعالة، وأساليب التقييم، ودمج التكنولوجيا في الفصول الدراسية.

•دعم البحث: توفير موارد لتمويل البحوث، وفرص التعاون، وإرشادات النشر.

•فرص مراجعة الأقران: تشجيع أعضاء هيئة التدريس على المشاركة في تقييمات الأقران لتحسين جودة التدريس وتبادل أفضل الممارسات.

•التعلم المستمر: دعم أعضاء هيئة التدريس الراغبين في مواصلة تعليمهم، أو الحصول على شهادات، أو حضور المؤتمرات للبقاء على اطلاع دائم في مجالات تخصصهم.

## مخطط مهارات البرنامج

| مخطط مهارات البرنامج               |    |    |    |          |    |    |    |         |    |    |    |                  |            |                                                         |                       |
|------------------------------------|----|----|----|----------|----|----|----|---------|----|----|----|------------------|------------|---------------------------------------------------------|-----------------------|
| مخرجات التعلم المطلوبة من البرنامج |    |    |    |          |    |    |    |         |    |    |    | اساسي أم اختياري | اسم المقرر | رمز المقرر                                              | السنة / المستوى       |
| القيم                              |    |    |    | المهارات |    |    |    | المعرفة |    |    |    |                  |            |                                                         |                       |
| ج4                                 | ج3 | ج2 | ج1 | ب4       | ب3 | ب2 | ب1 | أ4      | أ3 | أ2 | أ1 |                  |            |                                                         |                       |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | اساسي            | RSNR401    | موار طبيعية                                             | الرابعه /الفصل الاول  |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | اساسي            | RSOP403    | اختياري                                                 | الرابعه /الفصل الاول  |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | سائد             | RSWF405    | رياضيات الموجات والمجالات                               | الرابعه /الفصل الاول  |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | اساسي            | RSEP407    | معالجة الملوثات البيئية                                 | الرابعه /الفصل الاول  |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | اساسي            | RSRW409    | التحسس الثاني في الموارد المائية                        | الرابعه /الفصل الاول  |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | اساسي            | RSLC411    | تخطيط الغطاء الارضي                                     | الرابعه /الفصل الاول  |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | سائد             | EN413      | انكليزي 4-                                              | الرابعه /الفصل الاول  |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | اساسي            | RSP415     | مشروع تخرج                                              | الرابعه /الفصل الاول  |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | اساسي            | RSEA402    | تطبيقات بيئية في التحسس الثاني ونظم المعلومات الجغرافية | الرابعه /الفصل الثاني |
| *                                  | *  | *  | *  | *        | *  | *  | *  | *       | *  | *  | *  | اساسي            | RSRG404    | الاستشعار عن بعد في علوم الارض                          | الرابعه /الفصل الثاني |

|   |   |   |   |   |   |   |   |   |   |   |   |       |         |                               |                       |
|---|---|---|---|---|---|---|---|---|---|---|---|-------|---------|-------------------------------|-----------------------|
| * | * | * | * | * | * | * | * | * | * | * | * | اساسي | RSLU406 | تخطيط استعمالات الارض         | الرابعة /الفصل الثاني |
| * | * | * | * | * | * | * | * | * | * | * | * | اساسي | RSPL408 | تخطيط بيئي                    | الرابعة /الفصل الثاني |
| * | * | * | * | * | * | * | * | * | * | * | * | اساسي | RSHS410 | هيدروكيمياء                   | الرابعة /الفصل الثاني |
| * | * | * | * | * | * | * | * | * | * | * | * | اساسي | RSSF412 | المتحسسات المفاهيم والتطبيقات | الرابعة /الفصل الثاني |
| * | * | * | * | * | * | * | * | * | * | * | * | اساسي | RSST416 | تقنيات التحسس النائي          | الرابعة /الفصل الثاني |
| * | * | * | * | * | * | * | * | * | * | * | * | اساسي | RSP415  | مشروع بحث التخرج              | الرابعة /الفصل الثاني |

يرجى وضع اشارة في المربعات المقابلة لمخرجات التعلم الفردية من البرنامج الخاضعة للتقني

|                                                                                                                                                                                                                                                                                 |                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Remote Sensing and Image Interpretation"</li> <li>• Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman</li> <li>• Digital Image Processing for Remote Sensing"</li> <li>• Ioannis Kanellopoulos, George G. Wilkinson</li> </ul> | الكتب المقررة المطلوبة (إن وجدت )                                     |
| <ul style="list-style-type: none"> <li>• Remote Sensing of Environment</li> <li>• International Journal of Remote Sensing</li> <li>• IEEE Transactions on Geoscience and Remote Sensing</li> </ul>                                                                              | المراجع الرئيسية ( المصادر )                                          |
| <p>Hyperspectral Remote Sensing: Principles and Applications"</p> <p>Microwave Remote Sensing: Active and Passive"</p>                                                                                                                                                          | الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير.... ) |
| <ul style="list-style-type: none"> <li>• NASA Earthdata: يوفر بيانات مجانية من MODIS و الأقمار الصناعية مثل Landsat.</li> <li>• USGS Earth Explorer: مصدر للحصول على بيانات وصور من الأقمار الصناعية.</li> </ul>                                                                | المراجع الإلكترونية ، مواقع الانترنت                                  |

## المرحلة الرابعة / الفصل الدراسي الاول

### الموارد الطبيعية

|                                                       |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
|-------------------------------------------------------|---------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------|
| ١. اسم المقرر                                         |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| الموارد الطبيعية                                      |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| ٢. رمز المقرر                                         |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| RSNR401                                               |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| ٣. الفصل / السنة                                      |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| الفصل الاول / 2025-2026                               |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| ٤. تاريخ إعداد هذا الوصف                              |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| 2025/10/1                                             |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| ٥. أشكال الحضور المتاحة                               |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| حضور                                                  |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| ٦. عدد الساعات الدراسية (الكلي) / عدد الوحدات (الكلي) |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| 30/2 ساعه                                             |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| ٧. اسم مسؤول المقرر الدراسي ( اذا أكثر من اسم يذكر )  |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| الاسم: ا.م.د. زهراء نجم عبد الامير                    |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| ٨. اهداف المقرر                                       |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| اهداف المادة الدراسية                                 |         |                                            | <input type="checkbox"/> اعداد خريجين مختصين في التحسس النائي للمساهمة في تنمية البلد<br><input type="checkbox"/> تلبية احتياجات قطاعات الدولة بكوادر ذات كفاءة عالية<br><input type="checkbox"/> تشجيع المتميزين للعمل في القسم<br><input type="checkbox"/> تشجيع البرامج البحثية و المشاركة في المؤتمرات و الندوات العلمية<br><input type="checkbox"/> تحقيق الجودة و الاعتماد الاكاديمي |         |                    |
| ٩. استراتيجيات التعليم والتعلم                        |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| الاستراتيجية                                          |         |                                            | <ul style="list-style-type: none"> <li>• ادارة المحاضرة على نحو يشير الى اهمية الوقت</li> <li>• تكليف الطالب ببعض الواجبات الجماعية</li> <li>• مواقع الكترونية والصفوف الالكترونية</li> </ul>                                                                                                                                                                                              |         |                    |
| ١٠. بنية المقرر                                       |         |                                            |                                                                                                                                                                                                                                                                                                                                                                                            |         |                    |
| الأسبوع                                               | الساعات | مخرجات التعلم المطلوبة                     | اسم الوحدة او الموضوع                                                                                                                                                                                                                                                                                                                                                                      | التعداد | طريقة التقييم      |
| الاول                                                 | 2       | Land is the important valuable for mankind | Land Resources                                                                                                                                                                                                                                                                                                                                                                             | محاضرات | اسئلة عامة ومناقشة |
| الثاني                                                | 2       |                                            | Land degradation and                                                                                                                                                                                                                                                                                                                                                                       | محاضرات | اسئلة عامة ومناقشة |

|                    |         |                                                  |                                                                                                                                                                                                                                                                                                                                               |   |            |
|--------------------|---------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------|
|                    |         | soil erosion                                     | Land degradation of deterioration of soil of fertility and effects of Land degradation                                                                                                                                                                                                                                                        |   |            |
| اسئلة عامة ومناقشة | محاضرات | Desertification                                  | Desertification<br>It is a form of land degradation it is a progressive destruction or degradation of arisen maid lands to destruct                                                                                                                                                                                                           | 2 | الثالث     |
| اسئلة عامة ومناقشة | محاضرات | Land use and Land cover                          | Land is on food most precious assets and its use in malri-faceted . it provides food and shelter , it stores and filter water , Land derives its from the vegetation and crops that can be grown on it . land cover and land use                                                                                                              | 2 | الرابع     |
| اسئلة عامة ومناقشة | محاضرات | Soil sciences & Water Resources                  | Land is on food most precious assets and its use in malri-faceted . it provides food and shelter , it stores and filter water , Land derives its from the vegetation and crops that can be grown on it . land cover and land use,<br>Earth s water resource including rivers takes and underground a quivers are under stressing many regions | 2 | الخامس     |
| اسئلة عامة ومناقشة | محاضرات | The Habitable plant                              | Duplication of Fries Water                                                                                                                                                                                                                                                                                                                    | 2 | السادس     |
| اسئلة عامة ومناقشة | محاضرات | مراجعة                                           | مراجعة                                                                                                                                                                                                                                                                                                                                        | 2 | السابع     |
| امتحان اني         | محاضرات | امتحان اول                                       | امتحان                                                                                                                                                                                                                                                                                                                                        | 2 | الثامن     |
| اسئلة عامة ومناقشة | محاضرات | Minerals Resources & Types of Minerals Resources | It is a natured substance of organic or inorganic with definite chemical and physical properties and the basis of chemical physical properties , miners many by ground under two main categories of metallic non- metallic                                                                                                                    | 2 | التاسع     |
| امتحان شهري        | محاضرات | Recourses and Reserves                           | Total discovered and un discovered resources discovered sure yet and economically recoverable                                                                                                                                                                                                                                                 | 2 | العاشر     |
| اسئلة عامة ومناقشة | محاضرات | Energy Resources & Forests                       | Mined fuels are for generations of power , required by agriculture industry transport and other sector of the economy , a forest complex                                                                                                                                                                                                      | 2 | الحادي عشر |

|                    |         |                                    |                                                                                                                         |   |            |
|--------------------|---------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---|------------|
|                    |         |                                    | ecosy stem which is predominantly composed of three shrubs and is usually a closed canopy                               |   |            |
| اسئلة عامة ومناقشة | محاضرات | Ecological Role of Forests         | Forests proved an environment for many species of plants and animals that protects and sustains the diversity of nature | 2 | الثاني عشر |
| اسئلة عامة ومناقشة | محاضرات | Biodiversity                       | Types , importance and conservation methods , the term Biodiversity was coined and contraction of biological diversity  | 2 | الثالث عشر |
| اسئلة عامة ومناقشة | محاضرات | Renewable and non Renewable energy | Types and sources of nonrenewable Energy sources                                                                        | 2 | الرابع عشر |
| اسئلة عامة ومناقشة | محاضرات | امتحان نهاية الفصل الاول           | امتحان                                                                                                                  | 2 | الخامس عشر |

|                                                                                                                                                               |                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| ١١. تقييم المقرر                                                                                                                                              |                                                                        |
| توزيع الدرجة من 40 كسعي على وفق المهام المكلف بها الطالب مثل التحضير اليومي والامتحانات اليومية والشفوية والشهرية والتحريرية والتقارير .... الخ والفايل من 60 |                                                                        |
| ١٢. مصادر التعلم والتدريس                                                                                                                                     |                                                                        |
| Natural resources ,williams 2 <sup>nd</sup> edition 1989                                                                                                      | الكتب المقررة المطلوبة ( المنهجية أن وجدت )                            |
| Natural resources , Richardson ,new york 1994                                                                                                                 | المراجع الرئيسة ( المصادر )                                            |
| جميع البحوث المنشورة على مجلات سكوبس والمجلات المعتمدة                                                                                                        | الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير .... ) |
| <ul style="list-style-type: none"> <li>المواقع الالكترونية الرصينة.</li> <li>المكتبة الافتراضية.</li> <li>مواقع المكتبات في بعض الجامعات العالمية</li> </ul>  | المراجع الإلكترونية ، مواقع الانترنت                                   |

### موضوع اختياري (الامن السيبراني)

|                            |
|----------------------------|
| 1. اسم المقرر              |
| الامن السيبراني            |
| 2. رمز المقرر              |
| RSOP403                    |
| 3. فصلي / سنوي             |
| فصلي – الفصل الدراسي الاول |
| 4. تاريخ إعداد الوصف:      |
| 2025-10-1                  |

| 5. نماذج الحضور المتاحة:                                                                                                                                                                                                                                                                                                                                                                                                                             |         |                                                                                                                                                                                      |                                  |                  |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|---------------|
| حضورى - الكتروني                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |                                                                                                                                                                                      |                                  |                  |               |
| 6. عدد الساعات المعتمدة (الإجمالي) / عدد الوحدات (الإجمالي)                                                                                                                                                                                                                                                                                                                                                                                          |         |                                                                                                                                                                                      |                                  |                  |               |
| 30 ساعة / 2 وحدة                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |                                                                                                                                                                                      |                                  |                  |               |
| 7. اسم مسؤول المقرر (اذكر الكل إذا كان هناك أكثر من اسم)                                                                                                                                                                                                                                                                                                                                                                                             |         |                                                                                                                                                                                      |                                  |                  |               |
| اسم: مدرس دكتور زينب طالب درويش<br>Zainab.t@sc.uobaghdad.edu.iq بريد إلكتروني:                                                                                                                                                                                                                                                                                                                                                                       |         |                                                                                                                                                                                      |                                  |                  |               |
| 8. اهداف المقرر                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                                                                                                                                                                                      |                                  |                  |               |
| <ul style="list-style-type: none"> <li>• تعريف الطلبة بمفاهيم وتقنيات الأمن السيبراني الحديثة .</li> <li>• توظيف تقنيات نظم المعلومات الجغرافية في دعم الأمن السيبراني .</li> <li>• تنمية قدرة الطلبة على تحليل التهديدات والثغرات الأمنية .</li> <li>• فهم مبادئ حماية البيانات والشبكات والبنى التحتية الرقمية .</li> <li>• التعرف على أساسيات التشفير وأمن المعلومات .</li> <li>• تعزيز مهارات التفكير التحليلي وحل المشكلات الأمنية .</li> </ul> |         |                                                                                                                                                                                      |                                  |                  |               |
| 9. استراتيجيات التدريس والتعلم                                                                                                                                                                                                                                                                                                                                                                                                                       |         |                                                                                                                                                                                      |                                  |                  |               |
| <ul style="list-style-type: none"> <li>• المحاضرات النظرية باستخدام PowerPoint.</li> <li>• استخدام Google Classroom والمنصات الإلكترونية .</li> <li>• عرض فيديو هات تعليمية متخصصة .</li> <li>• المناقشات العلمية والعصف الذهني .</li> <li>• إعداد التقارير والبحوث الفردية والجماعية .</li> <li>• التعلم الذاتي والتعلم الإلكتروني</li> </ul>                                                                                                       |         |                                                                                                                                                                                      |                                  |                  |               |
| 10. هيكل المقرر                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                                                                                                                                                                                      |                                  |                  |               |
| الاسبوع                                                                                                                                                                                                                                                                                                                                                                                                                                              | الساعات | مخرجات التعلم المطلوبة                                                                                                                                                               | اسم او عنوان الوحدة              | طريقة التعلم     | طريقة التقييم |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2       | التعرف على مفهوم الأمن السيبراني                                                                                                                                                     | Introduction to Cybersecurity    | محاضرة نظرية     | امتحان شفهي   |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2       | التمييز بين الأمن السيبراني وأمن المعلومات                                                                                                                                           | Cybersecurity Concepts           | محاضرة ومناقشة   | امتحان تحريري |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2       | فهم أهداف ومجالات الأمن السيبراني                                                                                                                                                    | Cybersecurity Domains            | عرض تقديمي       | واجب          |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2       | في الأمن GIS تطبيق السيبراني                                                                                                                                                         | GIS and Cybersecurity            | محاضرة إلكترونية | تقرير         |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2       | تحليل التهديدات والثغرات                                                                                                                                                             | Threats and Vulnerabilities      | مناقشة علمية     | اختبار قصير   |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2       | <ul style="list-style-type: none"> <li>• التعرف على التهديدات السيبرانية الحديثة • مقدمة في استخدام الذكاء الاصطناعي في الأمن السيبراني - فهم Zero Trust أساسيات Security</li> </ul> | Emerging Trends in Cybersecurity | محاضرة           | امتحان        |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2       | فهم مبادئ الأمن                                                                                                                                                                      | Cybersecurity                    | محاضرة           | اختبار شفهي   |

|                                                                                                                                                                                                                                 |             |                            |                                                                                                          |   |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------|----------------------------------------------------------------------------------------------------------|---|----|
|                                                                                                                                                                                                                                 |             | Principles                 | السيبراني                                                                                                |   |    |
| واجب                                                                                                                                                                                                                            | عرض تقديمي  | Computing Environment      | دراسة مكونات بيئة الحوسبة                                                                                | 2 | 8  |
| امتحان                                                                                                                                                                                                                          | محاضرة      | Security Models            | التعرف على نماذج الأمن السيبراني                                                                         | 2 | 9  |
| اختبار                                                                                                                                                                                                                          | محاضرة      | Information Security       | أساسيات أمن المعلومات                                                                                    | 2 | 10 |
| واجب                                                                                                                                                                                                                            | شرح نظري    | Substitution Algorithms    | فهم خوارزميات الاستبدال                                                                                  | 2 | 11 |
| امتحان                                                                                                                                                                                                                          | محاضرة      | Transposition Algorithms   | فهم خوارزميات التبديل                                                                                    | 2 | 12 |
| اختبار                                                                                                                                                                                                                          | محاضرة      | Symmetric Key Cryptography | دراسة التشفير بالمفتاح المتماثل                                                                          | 2 | 13 |
| تقرير                                                                                                                                                                                                                           | مناقشة      | Cryptography Applications  | تطبيقات التشفير                                                                                          | 2 | 14 |
| امتحان نهائي                                                                                                                                                                                                                    | عرض ومناقشة | Future of Cybersecurity    | استشراف مستقبل الأمن السيبراني                                                                           | 2 | 15 |
| 11. تقييم المقرر                                                                                                                                                                                                                |             |                            |                                                                                                          |   |    |
| <ul style="list-style-type: none"> <li>• الاختبارات اليومية: 5 %</li> <li>• الواجبات والتقارير: 5 %</li> <li>• الامتحان العملي/النشاطات: 5 %</li> <li>• الامتحان نصف النهائي: 25 %</li> <li>• الامتحان النهائي: 60 %</li> </ul> |             |                            |                                                                                                          |   |    |
| 12. مصادر التدريس والتعلم                                                                                                                                                                                                       |             |                            |                                                                                                          |   |    |
| Information Security: The Complete Reference.                                                                                                                                                                                   |             | 1.                         | الكتب المقررة المطلوبة                                                                                   |   |    |
| Roadmap to Information Security for IT and Infosec Managers.                                                                                                                                                                    |             | 2.                         |                                                                                                          |   |    |
| ملازم ومحاضرات معدة من قبل التدريسي                                                                                                                                                                                             |             |                            | المراجع الرئيسية (المصادر)                                                                               |   |    |
| البحوث المنشورة ضمن مجلات سكوباس والمجلات العلمية الرصينة .                                                                                                                                                                     |             |                            | الكتب والمراجع التي يوصى بها (المجلات العلمية، التقارير، .....)                                          |   |    |
| <a href="#">Cisco Networking Academy</a><br><a href="#">NIST Cybersecurity Resources</a><br><a href="#">ENISA Cybersecurity Publications</a>                                                                                    |             |                            | <ul style="list-style-type: none"> <li>• المراجع الالكترونية</li> <li>• مواقع الانترنت، .....</li> </ul> |   |    |

## معالجة ملوثات بيئية

|    |                       |                                   |
|----|-----------------------|-----------------------------------|
| 1. | اسم المقرر            | معالجة ملوثات بيئية               |
| 2. | رمز المقرر :          | RSEP407                           |
| 3. | فصلي / سنوي :         | فصلي                              |
| 4. | تاريخ إعداد الوصف :   | 2025-10-1 للعام الدراسي 2025-2026 |
| 5. | نماذج الحضور المتاحة: | حضور و الكتروني                   |

| 6. عدد الساعات المعتمدة (الإجمالي) / عدد الوحدات (الإجمالي) 30 / 2 UNITS                                                                                                                                                                                                                   |         |                                                                             |                                          |                                                                                                                                                                              |                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 30 ساعة/2 وحدة                                                                                                                                                                                                                                                                             |         |                                                                             |                                          |                                                                                                                                                                              |                                               |
| 7. اسم مسؤول المقرر (اذكر الكل إذا كان هناك أكثر من اسم)                                                                                                                                                                                                                                   |         |                                                                             |                                          |                                                                                                                                                                              |                                               |
| اسم: ا د سندس عبد العباس البكري<br>بريد إلكتروني: Dr.Sundus A.Abdullah Albakry<br>Email: <a href="mailto:sundus.abdullah@sc.uobaghdad.edu.iq">sundus.abdullah@sc.uobaghdad.edu.iq</a>                                                                                                      |         |                                                                             |                                          |                                                                                                                                                                              |                                               |
| 8. اهداف المقرر                                                                                                                                                                                                                                                                            |         |                                                                             |                                          |                                                                                                                                                                              |                                               |
| 1 - معرفة أسس علم البيئة وأنواع الملوثات وكيفية معالجتها<br>2 - معرفة الأسس النظرية لهندسة البيئة وكيفية قياس الملوثات<br>3 - معرفة أهمية ربط علم البيئة بالتخطيط الحضري وارتباطها بعلم التحسس<br>4- التعريف باهداف التنمية المستدامة وكيفية تحقيقها                                       |         |                                                                             |                                          |                                                                                                                                                                              |                                               |
| 9. استراتيجيات التدريس والتعلم                                                                                                                                                                                                                                                             |         |                                                                             |                                          |                                                                                                                                                                              |                                               |
| 1 – القدرة على تطبيق تقنيات تحليل بيانات التحسس النائي مع الأخذ بنظر الاعتبار القيود التكنولوجية العالمية والمحلية.<br>2 – تحليل المشاكل العلمية والتوصل الى حلها والقابلية على اقتراح البدائل المناسبة .<br>3 - الاستقصاء العلمي والتقويم.<br>4 – المناقشات العلمية البنائة وابداء الرأي. |         |                                                                             |                                          |                                                                                                                                                                              |                                               |
| 10. هيكل المقرر                                                                                                                                                                                                                                                                            |         |                                                                             |                                          |                                                                                                                                                                              |                                               |
| الاسبوع                                                                                                                                                                                                                                                                                    | الساعات | مخرجات التعلم المطلوبة                                                      | اسم او عنوان الوحدة                      | طريقة التعلم                                                                                                                                                                 | طريقة التقييم                                 |
| 1                                                                                                                                                                                                                                                                                          | 2       | تعريف اساسية<br>Definition<br>Introduction                                  | Treatment<br>environmental<br>pollutants | عرض المحاضرة من خلال برنامج "مايكروسوفت بوربوينت" و تلفزيون رقمي(52 انج) +الصبورة اليدوية او الكترونية باستخدام منصة (كوكل كلاس روم) ونشر محاضرات فدية من خلال قناة اليوتيوب |                                               |
| 2                                                                                                                                                                                                                                                                                          | 2       | اساسيات النظام البيئي<br>Fundamental of Ecology<br>remote sensing           | Treatment<br>environmental<br>pollutants | عرض المحاضرة من خلال برنامج "مايكروسوفت بوربوينت" و تلفزيون رقمي(52 انج) +الصبورة اليدوية او الكترونية باستخدام منصة (كوكل كلاس روم) ونشر محاضرات فدية من خلال قناة اليوتيوب | امتحان شفهي<br>وتحريري حضوري<br>او الالكتروني |
| 3                                                                                                                                                                                                                                                                                          | 2       | Soil and water remediation and Remediation technologies scientific contents | Treatment<br>environmental<br>pollutants | عرض المحاضرة من خلال برنامج "مايكروسوفت بوربوينت" و تلفزيون                                                                                                                  | امتحان شفهي<br>وتحريري حضوري<br>او الالكتروني |

|                                               |                                                                                                                                                                                                              |                                          |                                                                                                                                                                                                                                                                |   |   |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|
|                                               | رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب                                                                         |                                          | <ul style="list-style-type: none"> <li>- Historical View</li> <li>- Definitions of remediation.</li> <li>- In Situ Treatment Technologies.</li> <li>- Ex situ Treatment Technologies.</li> </ul> <p>أنواع التربة<br/>والمعالجات البيئية<br/>لملوثات التربة</p> |   |   |
| امتحان شفهي<br>وتحريري حضوري<br>او الالكتروني | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | أنواع الملوثات الغازية<br><br>Types of pollution<br>1-Primary of<br>pollutants<br>SO and Co2<br>Pollutions                                                                                                                                                     | 2 | 4 |
| امتحان شفهي<br>وتحريري حضوري<br>او الالكتروني | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | Soil and water<br>remediation and<br>remediation<br>technologies                                                                                                                                                                                               | 2 | 5 |
|                                               | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | Air pollution control<br>devices<br>-Cyclone, setting<br>chamber and fabric<br>filters                                                                                                                                                                         | 2 | 6 |
| امتحان شفهي<br>وتحريري                        | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | Physical treatments<br>of pollutants'                                                                                                                                                                                                                          | 2 | 7 |

|                                               |                                                                                                                                                                                                              |                                          |                                                                                                                                              |   |    |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---|----|
| امتحان شفهي<br>وتحريرى حضوري<br>او الالكتروني | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | Biological treatments<br>of pollutants'                                                                                                      | 2 | 8  |
| امتحان شفهي<br>وتحريرى حضوري<br>او الالكتروني | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | Limitations of<br>Biological technology<br>Bioremediation.<br><br>- Bioventing.<br>Biosorption<br>-pathways of<br>hydrocarbon<br>metabolism. | 2 | 9  |
| امتحان شفهي<br>وتحريرى حضوري<br>او الالكتروني | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | Thermal technology<br>treatments<br>-Advantages and<br>disadvantage                                                                          | 2 | 10 |
| امتحان شفهي<br>وتحريرى حضوري<br>او الالكتروني |                                                                                                                                                                                                              | Treatment<br>environmental<br>pollutants | Chemical extraction<br>treatments                                                                                                            | 2 | 11 |
| امتحان شفهي<br>وتحريرى حضوري<br>او الالكتروني | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | Technology<br>applicability for<br>biological and thermal                                                                                    | 2 | 12 |
| امتحان شفهي<br>وتحريرى حضوري<br>او الالكتروني | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | Separation<br>Technology<br>description                                                                                                      | 2 | 13 |
| امتحان شفهي<br>وتحريرى حضوري<br>او الالكتروني | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون                                                                                                                                         | Treatment<br>environmental<br>pollutants | Remediation of<br>Wastewater by using<br>biofilms<br><b>Updating</b>                                                                         | 2 | 14 |

|                                               |                                                                                                                                                                                                              |                                          |                                                                                                                                                                                                                                                                             |   |    |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|
|                                               | رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب                                                                         |                                          | <u>Syllabus(2025)</u><br><br>-The ecological<br>impacts of urban<br>centers<br>-Uncontrolled<br>Physical Expansion                                                                                                                                                          |   |    |
| امتحان شفهي<br>وتحريري حضوري<br>او الالكتروني | عرض المحاضرة من<br>خلال برنامج<br>"مايكروسوفت<br>بوربوينت" و تلفزيون<br>رقمي(52 انج)<br>+الصبورة اليدوية<br>او الالكترونية باستخدام<br>منصة (كوكل كلاس<br>رووم) ونشر محاضرات<br>فدية من خلال قنا<br>اليوتيوب | Treatment<br>environmental<br>pollutants | Types of pollution<br>1-Primary of<br>pollutants<br>SO and Co2<br>Pollutions<br><br><u>Updating<br/>Syllabus (2024)</u><br><br>1- Reflectance<br>properties and<br>physiological metal<br>and petroleum<br>contamination<br><br>2-Study reflectance<br>curves of pollutants | 2 | 15 |

#### 10. تقييم المقرر:

توزيع الدرجة من 100 حسب المهام الموكلة للطلاب مثل التحضير اليومي أو الامتحانات الشفهية أو الشهرية أو الكتابية والتقارير .... الخ

#### 11. مصادر التدريس والتعلم

|                                                                                                                                                                                                                                                                                                                              |                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Thirumurthy A 2004, Principles of Environmental Science and Management.<br>Shroff Publishers.<br><br>Essentials of Ecology Third Edition by Colin Michael-                                                                                                                                                                   | الكتب المقررة المطلوبة                                                |
| اعتماد ملازم معه من قبل التدريسي على شكل ملفات pdf و PowerPoint والتسجيل<br>الفيدوي لشرح المادة، اضافة الى الكتب العلمية المنشورة المتعلقة بالمادة الدراسية                                                                                                                                                                  | المراجع الرئيسية<br>(المصادر)                                         |
| جميع البحوث المنشورة على مجلات سكوباس                                                                                                                                                                                                                                                                                        | الكتب والمراجع التي<br>يوصى بها (المجلات<br>العلمية، التقارير، .....) |
| جميع النشرات الجديدة والبرامج التي تنشر من خلال المواقع الإلكترونية المعتمدة. معظم الم<br>المتخصصة على الشبكة العنكبوتية مثل ogle , Library Genesis , Scientific<br>American ,Research Gate, Scholar و جميع النشرات الجديدة والبرامج التي تنشر<br>خلال المواقع الإلكترونية المعتمدة لغرض انجاز تقارير الطلبة والتزود بالمعلو | المراجع الالكترونية<br>،مواقع الانترنت ،.....                         |

## المرحلة الرابعة / الفصل الدراسي الثاني

### التخطيط البيئي

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |                                                                |                                                                                       |                                      |                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------|------------------|
| 12. اسم المقرر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                                                                |                                                                                       |                                      |                  |
| التخطيط البيئي                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                                                                |                                                                                       |                                      |                  |
| 13. رمز المقرر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                                                                |                                                                                       |                                      |                  |
| RSPL408                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |                                                                |                                                                                       |                                      |                  |
| 14. فصلي / سنوي                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |                                                                |                                                                                       |                                      |                  |
| فصلي                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |                                                                |                                                                                       |                                      |                  |
| 15. تاريخ إعداد الوصف:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |                                                                |                                                                                       |                                      |                  |
| 2026-3-10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |                                                                |                                                                                       |                                      |                  |
| 16. نماذج الحضور المتاحة:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |                                                                |                                                                                       |                                      |                  |
| حضور                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |                                                                |                                                                                       |                                      |                  |
| 17. عدد الساعات المعتمدة (الإجمالي) / عدد الوحدات (الإجمالي)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                                                                |                                                                                       |                                      |                  |
| 30 - 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |                                                                |                                                                                       |                                      |                  |
| 18. اسم مسؤول المقرر (اذكر الكل إذا كان هناك أكثر من اسم)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |                                                                |                                                                                       |                                      |                  |
| اسم: م.د. خالد عباس حسين                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |                                                                |                                                                                       |                                      |                  |
| بريد إلكتروني:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                                                                |                                                                                       |                                      |                  |
| 19. اهداف المقرر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |                                                                |                                                                                       |                                      |                  |
| <ul style="list-style-type: none"><li>1. فهم مبادئ ومفاهيم التخطيط البيئي.</li><li>2. تعريف الطلاب بالقوانين واللوائح البيئية والسياسات المتعلقة.</li><li>3. تطوير مهارات إجراء التقييمات البيئية وتقييم التأثير.</li><li>4. استكشاف استراتيجيات التنمية المستدامة وإدارة الموارد.</li><li>5. اكتساب معرفة في تقنيات تخطيط الاستخدام الأرضي وعمليات التخطيط الشاملة.</li><li>6. تطوير مهارات فعّالة في مشاركة أصحاب المصلحة والتواصل.</li><li>7. التعامل مع التغيرات المناخية ودمج تخطيط الصمود في التخطيط البيئي.</li><li>8. تحليل دراسات حالة حقيقية لفهم التحديات وأفضل الممارسات.</li><li>9. مراعاة الاعتبارات الأخلاقية والأطر القرارية في التخطيط البيئي.</li><li>10. اكتساب مهارات عملية في تطوير وتنفيذ المشاريع.</li></ul> |         |                                                                |                                                                                       |                                      |                  |
| <ul style="list-style-type: none"><li>استراتيجيات التدريس والتعلم</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |                                                                |                                                                                       |                                      |                  |
| استراتيجيات التدريس والتعلم تشمل المحاضرات، والمناقشات، والأنشطة التطبيقية، والعمل الجماعي، ودراسات الحالة، والموارد المتعددة الوسائط، وتكامل التكنولوجيا، والتقييم التكويني، والتعلم المخصص، والتفكير التأملي، والتعلم التجريبي، والتدرج التدريجي، وتقديم الملاحظات والتقييم، والتعلم النشط، والتعلم المتميز. تهدف هذه الاستراتيجيات إلى مشاركة الطلاب، وتعزيز التفكير النقدي، وتعزيز الفهم واكتساب المهارات.                                                                                                                                                                                                                                                                                                                      |         |                                                                |                                                                                       |                                      |                  |
| 20. هيكل المقرر                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |                                                                |                                                                                       |                                      |                  |
| الاسبوع                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | الساعات | مخرجات التعلم المطلوبة                                         | اسم او عنوان الوحدة                                                                   | طريقة التعلم                         | طريقة التقييم    |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         | فهم مبادئ التخطيط البيئي، بما في ذلك دور العلم والسياسة وإشراك | Introduction <ul style="list-style-type: none"><li>Conceptual framework for</li></ul> | تشمل طرق التعلم الشائعة التعلم النشط | تشمل طرق التقييم |

|                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |  |
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| <p>الشائعة الاختبارات/الامتحانانات (التقييمات الكتابية أو الشفهية)، والواجبات/المشاريع، والعروض التقديمية/العروض التوضيحية، وتقييمات الأداء، والحافظات (مجموعة عينات العمل)، والملاحظات، والتقييم الذاتي/التأمل. تُستخدم هذه الأساليب لقياس تقدم الطلاب وتقييم الفهم والمهارات وتطبيق المعرفة.</p> | <p>(إشراك الطلاب في المناقشات والأنشطة العملية)، والتعلم التعاوني (تعزيز التعاون بين الطلاب)، والتعلم القائم على حل المشكلات (حل مشكلات العالم الحقيقي)، والتعلم القائم على المشروعات (تطبيق المعرفة على المشروعات العملية)، والتكنولوجيا. التعلم القائم على الموارد الرقمية)، والتعلم الموجه ذاتياً (أخذ زمام المبادرة في التعلم بشكل مستقل).</p> | <p>environmental planning</p> <ul style="list-style-type: none"> <li>The concept of environmental planning</li> <li>planning elements</li> </ul> <p>Characteristics of a successful plan</p> | <p>أصحاب المصلحة في عملية التخطيط. 2. تحليل وتفسير البيانات البيئية، مثل نوعية الهواء والماء، وأنماط استخدام الأراضي، والنظم البيئية. 3. تطبيق الأساليب الكمية والنوعية لتقييم تأثيرات الأنشطة البشرية على البيئة، ووضع استراتيجيات التخفيف من تلك التأثيرات. 4. تطوير الخطط والسياسات البيئية التي توازن بين الأهداف البيئية والاجتماعية والاقتصادية، وتأخذ في الاعتبار احتياجات ووجهات نظر أصحاب المصلحة المتنوعين. 5. التواصل بشكل فعال مع مختلف الجماهير، بما في ذلك صناعات السياسات، ومجموعات المجتمع، والجمهور، حول القضايا والحلول البيئية. 6. تطبيق المعايير الأخلاقية والمهنية في التخطيط البيئي، بما في ذلك مبادئ الاستدامة والإنصاف والعدالة الاجتماعية.</p> |   |  |
|                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                    | <p>Planning</p> <ul style="list-style-type: none"> <li>Planning concept</li> <li>Planning Obstacles</li> <li>Planning principles</li> </ul> <p>Planning objectives</p>                       | <p>1. فهم تاريخ التخطيط ونظريته وممارسته، بما في ذلك دور التخطيط في تشكيل المجتمعات والمناطق مع مرور الوقت. 2. تحليل وتفسير البيانات والمعلومات المتعلقة باستخدام الأراضي والنقل والإسكان والتنمية الاقتصادية وموضوعات التخطيط الأخرى. 3. تطبيق الأساليب الكمية والنوعية لتقييم آثار قرارات التخطيط</p>                                                                                                                                                                                                                                                                                                                                                                 | 2 |  |

|  |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |  |
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|  |                                                                                                                                                                                                                  | <p>وضع استراتيجيات لمعالجة مشاكل التخطيط المعقدة.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |  |
|  | <ul style="list-style-type: none"> <li>Planning types</li> <li>Planning models</li> </ul> <p>Kaufman model for strategic planning</p>                                                                            | <p>4. وضع الخطط والسياسات التي تعكس قيم واحتياجات مختلف أصحاب المصلحة، بما في ذلك أفراد المجتمع والمسؤولين الحكوميين والجهات الفاعلة في القطاع الخاص.</p> <p>5. التواصل بشكل فعال مع جماهير متنوعة، بما في ذلك من خلال التقارير المكتوبة والعروض الشفهية والوسائط المرئية.</p> <p>6. تطبيق المعايير الأخلاقية والمهنية في التخطيط، بما في ذلك مبادئ العدالة الاجتماعية، والاستدامة البيئية، والمشاركة الديمقراطية</p>                                                                                                                                           | 3 |  |
|  | <ul style="list-style-type: none"> <li>Fundamentals of Environment</li> <li>Ecology</li> <li>Ecosystem</li> <li>Environmental system</li> <li>Environmental equilibrium</li> </ul> <p>Environmental problems</p> | <p>1. فهم المفاهيم والمبادئ الأساسية لعلم البيئة، بما في ذلك النظم البيئية، والتنوع البيولوجي، وتغير المناخ، والتلوث.</p> <p>2. تحليل وتفسير البيانات والمعلومات المتعلقة بالقضايا البيئية، بما في ذلك البيانات العلمية ووثائق السياسات والتقارير الإعلامية.</p> <p>3. تطبيق مهارات التفكير النقدي وحل المشكلات لمواجهة التحديات البيئية المعقدة، وتطوير الحلول التي توازن بين الاعتبارات البيئية والاجتماعية والاقتصادية.</p> <p>4. التواصل بشكل فعال حول القضايا والحلول البيئية، بما في ذلك من خلال التقارير المكتوبة والعروض التقديمية الشفهية والوسائط</p> | 4 |  |

|  |                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |   |
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|  |                                                                                                            | المرئية                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |   |
|  | Review and 1 <sup>st</sup> Exam                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | 5 |
|  | <ul style="list-style-type: none"> <li>The Role of the Planner in Environmental Planning</li> </ul> Zoning | 1. تطبيق الأساليب الكمية والنوعية لتقييم الآثار البيئية لقرارات التخطيط، ووضع استراتيجيات التخفيف من تلك الآثار.<br>2. تطوير الخطط والسياسات البيئية التي توازن بين الاعتبارات البيئية والاجتماعية والاقتصادية، وتعكس احتياجات ووجهات نظر أصحاب المصلحة المتنوعين.<br>5. التواصل بشكل فعال مع مختلف الجماهير، بما في ذلك صانعي السياسات، ومجموعات المجتمع، والجمهور، حول الآثار البيئية لقرارات التخطيط.<br>3. تطبيق المعايير الأخلاقية والمهنية في التخطيط البيئي، بما في ذلك مبادئ الاستدامة والإنصاف والعدالة الاجتماعية |  | 6 |
|  | Steps in the Environmental Planning Process                                                                | 1. التعاون مع الآخرين، بما في ذلك الأقران وأعضاء المجتمع والخبراء لمواجهة التحديات البيئية وتطوير حلول مبتكرة.<br>2. تطبيق المعايير الأخلاقية والمهنية في الدراسات البيئية، بما في ذلك مبادئ العدالة الاجتماعية والاستدامة والنزاهة العلمية.                                                                                                                                                                                                                                                                                |  | 7 |
|  | Environmental impact assessment                                                                            | 1. فهم الإطار القانوني والتنظيمي لتقييم الأثر البيئي، بما في ذلك القوانين والسياسات والمبادئ التوجيهية الوطنية والدولية.<br>2. تحليل وتفسير البيانات                                                                                                                                                                                                                                                                                                                                                                        |  | 8 |

|  |  |                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |  |
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|  |  |                                                                                 | <p>والمعلومات البيئية، مثل جودة الهواء والماء، وأنماط استخدام الأراضي، والنظم البيئية، لتقييم الآثار البيئية المحتملة للمشاريع أو الأنشطة المقترحة.</p> <p>3. تطبيق الأساليب الكمية والنوعية لتقييم الآثار البيئية المحتملة للمشاريع أو الأنشطة المقترحة، ووضع استراتيجيات التخفيف من تلك الآثار.</p> <p>4. تطوير تقارير ووثائق تقييم الأثر البيئي التي تلي المتطلبات التنظيمية والتي تنقل بشكل فعال التأثيرات البيئية المحتملة للمشاريع أو الأنشطة المقترحة.</p> |    |  |
|  |  | Environmental Impact Assessment Form                                            | <p>5. التواصل بشكل فعال مع مختلف أصحاب المصلحة، بما في ذلك مطوري المشاريع والمسؤولين الحكوميين والجمهور، حول الآثار البيئية المحتملة للمشاريع أو الأنشطة المقترحة، واستراتيجيات التخفيف من تلك الآثار.</p> <p>6. تطبيق المعايير الأخلاقية والمهنية في تقييم الأثر البيئي، بما في ذلك مبادئ النزاهة العلمية والشفافية والمشاركة العامة.</p>                                                                                                                        | 9  |  |
|  |  | Environmental planning (the capital of Islamic civilization Baghdad as a model) | <p>1. فهم تاريخ ونظرية وممارسة التخطيط البيئي، ودور المخططين في تشكيل السياسة البيئية وصنع القرار.</p> <p>2. تحليل وتفسير البيانات البيئية، مثل جودة الهواء والماء، وأنماط استخدام الأراضي، والأنظمة البيئية، واستخدام هذه المعلومات لإرشاد قرارات التخطيط.</p>                                                                                                                                                                                                   | 10 |  |

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|  |                                                                                                                                                                           | <p>1. فهم المفاهيم والمبادئ الأساسية للقانون البيئي، بما في ذلك المبدأ التحوطي، ومبدأ الملوث يدفع، والتنمية المستدامة.</p> <p>2. تحليل وتفسير القوانين واللوائح والسياسات البيئية الوطنية والدولية وأثارها على حماية البيئة وتحسينها.</p> <p>3. تطبيق مهارات البحث والتحليل القانوني لتقييم مدى كفاية وفعالية القوانين والسياسات البيئية الحالية.</p> <p>4. تطوير الاستراتيجيات والحلول القانونية لمواجهة التحديات البيئية، مثل تغير المناخ والتلوث وفقدان التنوع البيولوجي.</p> <p>5. التواصل بشكل فعال مع مختلف أصحاب المصلحة، بما في ذلك صانعي السياسات والمسؤولين الحكوميين والجمهور، حول الآثار القانونية للقضايا والحلول البيئية.</p> <p>6. تطبيق المعايير الأخلاقية والمهنية في القانون البيئي، بما في ذلك مبادئ العدالة الاجتماعية، والأخلاق البيئية، والأخلاق القانونية.</p> |  | 11 |
|  | Review and 2 <sup>nd</sup> Exam                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | 12 |
|  | <p>ISO 14000 environmental management group International standard for environmental management system ISO 14001 ISO (International Organization for Standardization)</p> | <p>1. فهم مبادئ ومتطلبات ISO 14001 معيار ، بما في ذلك دورة التخطيط والتنفيذ والتحقق ونهج العملية (PDCA) في الإدارة البيئية.</p> <p>2. تحليل وتفسير البيانات والمعلومات البيئية، مثل استخدام الطاقة، والانبعاثات الغازات</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 13 |

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|  |  |                                    | <p>الدفيئة، وتوليد النفايات، لتحديد فرص تحسين الأداء البيئي.</p> <p>3. تطبيق المواصفة ISO 14001 القياسية لتطوير وتنفيذ نظام الإدارة البيئية الذي يلبي متطلبات المواصفة ومصمم خصيصًا لتلبية احتياجات وأهداف منظمة معينة.</p> <p>4. تطوير وتنفيذ السياسات والإجراءات والضوابط البيئية التي تهدف إلى الحد من الآثار البيئية وتحسين الأداء البيئي.</p> <p>5. إجراء عمليات التدقيق الداخلي والمراجعات الإدارية لتقييم فعالية نظام الإدارة البيئية للمنظمة وتحديد فرص التحسين.</p> <p>6. تطبيق المعايير الأخلاقية والمهنية في الإدارة البيئية، بما في ذلك مبادئ الشفافية والمساءلة والتحسين المستمر.</p> |    |  |
|  |  | Environmental Management ISO 14001 | <p>1. فهم مبادئ ومتطلبات ، ISO 14001 معيار بما في ذلك دورة التخطيط والتنفيذ والتحقق ( ونهج العملية PDCA ) في الإدارة البيئية.</p> <p>2. تحليل وتفسير البيانات والمعلومات البيئية، مثل استخدام الطاقة، وانبعاثات الغازات، الدفيئة، وتوليد النفايات، لتحديد فرص تحسين الأداء البيئي.</p> <p>3. تطبيق المواصفة ISO 14001 القياسية لتطوير وتنفيذ نظام الإدارة البيئية الذي يلبي متطلبات المواصفة ومصمم خصيصًا لتلبية</p>                                                                                                                                                                               | 14 |  |

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|  |  |                                                                                                                                                               | <p>احتياجات وأهداف منظمة معينة.</p> <p>4. تطوير وتنفيذ السياسات والإجراءات والضوابط البيئية التي تهدف إلى الحد من الآثار البيئية وتحسين الأداء البيئي.</p> <p>5. إجراء عمليات التدقيق الداخلي والمراجعات الإدارية لتقييم فعالية نظام الإدارة البيئية للمنظمة وتحديد فرص التحسين.</p> <p>6. تطبيق المعايير الأخلاقية والمهنية في الإدارة البيئية، بما في ذلك مبادئ الشفافية والمساءلة والتحسين المستمر.</p>                                                                                                                                                         |    |  |
|  |  | <p>Group Assessment:<br/>Design a group evaluation session where students can present their ideas and provide feedback to each other, promoting teamwork.</p> | <p><b>التواصل الفعال :</b></p> <p>سيتمكن الطلاب من تقديم أفكارهم بوضوح وإيجاز لزملائهم، باستخدام لغة مناسبة ووسائل بصرية لتعزيز الفهم.</p> <p>1. التعاون الجماعي: سيظهر الطلاب القدرة على العمل بفاعلية داخل مجموعة، من خلال المساهمة في المناقشات، وتقدير وجهات النظر المتنوعة، ودعم تعلم بعضهم البعض طوال الجلسة.</p> <p>2. التغذية الراجعة النقدية: سيطور الطلاب المهارات اللازمة لتقديم تغذية راجعة بناءة لزملائهم، مع التركيز على نقاط القوة ومجالات التحسين، والتعبير عن آرائهم باحترام ودعم.</p> <p>3. تطبيق المعرفة: سيقوم الطلاب بتطبيق المفاهيم التي</p> | 15 |  |

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|                                                                                                                                                                                                                                                                                                                                            |  |  | <p>تعلموها في الدورة لتقييم وانتقاد عروض زملائهم، مما يدل على فهمهم لمبادئ وأساليب التخطيط البيئي.</p> <p>4. حل المشكلات :سيشارك الطلاب في حل المشكلات بشكل جماعي من خلال مناقشة التحديات واقتراح حلول محتملة أثناء جلسات التقييم، مما يعزز بيئة تعلم تعاونية.</p> <p>5. الانعكاس والتقييم الذاتي :سيعكس الطلاب مساهماتهم وتجاربهم التعليمية في تقييم المجموعة، مع تحديد نقاط القوة الشخصية ومجالات التطوير الإضافية في مهارات العمل الجماعي وعرض الأفكار.</p> |  |  |
| <b>21. تقييم المقرر</b>                                                                                                                                                                                                                                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |
| <p>توزيع الدرجة من 100 حسب المهام الموكلة للطلاب كما يلي:-</p> <p>التحضير اليومي :- 5%</p> <p>عن طريق الشفهي يومياً :- 5%</p> <p>الإمتحانات الشهرية :- 10%</p> <p>التقارير : 5%</p> <p>المختبر : 15%</p> <p>الإمتحان النهائي : 60</p>                                                                                                      |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |
| <b>22. مصادر التدريس والتعلم</b>                                                                                                                                                                                                                                                                                                           |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |
| <p>Tom Daniels, "THE ENVIRONMENTAL PLANNING HANDBOOK FOR SUSTAINABLE COMMUNITIES AND REGIONS", 2<sup>nd</sup> Ed., Copyright © 2014 Taylor &amp; Francis</p> <p>JUDITH PETTS , “Handbook of Environmental Impact Assessment”, University of Birmingham, 1999</p>                                                                           |  |  | <b>الكتب المقررة المطلوبة</b>                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |
| ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN                                                                                                                                                                                                                                                                          |  |  | <b>المراجع الرئيسية (المصادر)</b>                                                                                                                                                                                                                                                                                                                                                                                                                              |  |  |
| <p>Books:</p> <ul style="list-style-type: none"> <li>"Environmental Land Use Planning and Management" by John Randolph and Gilbert M. Masters</li> <li>"Environmental Planning Handbook" by Tom Daniels and Katherine Daniels</li> <li>"Environmental Impact Assessment: Theory and Practice" by Peter Morris and Riki Therivel</li> </ul> |  |  | <p><b>الكتب والمراجع التي يوصى بها (المجلات العلمية، التقارير ،.....)</b></p>                                                                                                                                                                                                                                                                                                                                                                                  |  |  |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• "Sustainable Urban Development Reader" edited by Stephen M. Wheeler and Timothy Beatley</li> <li>• "Principles and Practice of Urban Planning" by Alan M. Berger and Joel Kotkin</li> <li>• "Introduction to Environmental Impact Assessment: A Guide to Principles and Practice" by John Glasson, Riki Therivel, and Andrew Chadwick</li> <li>• "Sustainable Communities: Planning for the 21st Century" by Woodrow W. Clark II</li> <li>• "Environmental Planning: Policies, Perception, and Practice" by Ian Thomas and Mike J. Morley</li> <li>• "Land Use Planning and the Environment: A Casebook" by Robert R. Wright and Gary N. Young</li> <li>• "Planning Sustainable Cities and Regions: Towards More Equitable Development" by Karen Chapple</li> </ul> <p>Scientific Journals and Reports:</p> <ul style="list-style-type: none"> <li>• Environmental Impact Assessment Review</li> <li>• Journal of Environmental Planning and Management</li> <li>• Environmental Planning and Management</li> <li>• Sustainable Cities and Society</li> <li>• Journal of Environmental Management</li> <li>• Environmental Science &amp; Policy</li> <li>• Environmental Planning B: Planning and Design</li> <li>• Global Environmental Change</li> <li>• Environmental Research Letters</li> <li>• United Nations Environment Programme (UNEP) reports and publications</li> </ul> |                                                      |
| <ul style="list-style-type: none"> <li>• United Nations Environment Programme (UNEP): The UNEP website offers a wealth of resources on environmental planning, sustainable development, and policy frameworks. It provides access to reports, publications, and tools related to environmental planning and management. Website: <a href="https://www.unep.org/">https://www.unep.org/</a></li> <li>• World Resources Institute (WRI): WRI focuses on research and initiatives related to sustainable development, including urban planning and land use. Their website offers publications, data platforms, and tools that can inform environmental planning practices. Website: <a href="https://www.wri.org/">https://www.wri.org/</a></li> <li>• Environmental Protection Agency (EPA): The EPA website provides information on environmental regulations, policies, and planning approaches. It offers resources on environmental impact assessment, land use planning, and sustainable development practices. Website: <a href="https://www.epa.gov/">https://www.epa.gov/</a></li> </ul>                                                                                                                                                                                                                                                                                                                               | <p>المراجع الإلكترونية<br/>مواقع الانترنت، .....</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <ul style="list-style-type: none"> <li>• International Association for Impact Assessment (IAIA): IAIA is a professional organization dedicated to environmental impact assessment. Their website provides access to publications, guidelines, and resources related to impact assessment and planning. Website: <a href="https://www.iaia.org/">https://www.iaia.org/</a></li> <li>• Global Environment Facility (GEF): GEF funds various environmental projects worldwide. Their website offers publications, reports, and resources on sustainable development and environmental planning. Website: <a href="https://www.thegef.org/">https://www.thegef.org/</a></li> <li>• ICLEI - Local Governments for Sustainability: ICLEI is a global network of local and regional governments committed to sustainable development. Their website provides resources, case studies, and tools for local-level environmental planning and implementation. Website: <a href="https://iclei.org/">https://iclei.org/</a></li> <li>• European Environment Agency (EEA): The EEA website provides environmental information, data, and reports for Europe. It covers topics such as land use, spatial planning, and sustainable development strategies. Website: <a href="https://www.eea.europa.eu/">https://www.eea.europa.eu/</a></li> <li>• National Renewable Energy Laboratory (NREL): NREL focuses on renewable energy research and planning. Their website offers tools, reports, and publications related to energy planning and sustainable development. Website: <a href="https://www.nrel.gov/">https://www.nrel.gov/</a></li> <li>• The Nature Conservancy: The Nature Conservancy website provides resources and case studies on conservation planning, ecosystem management, and sustainable land use practices. Website: <a href="https://www.nature.org/">https://www.nature.org/</a></li> <li>• Environmental Planning and Management online journals: Access online journals such as "Environmental Impact Assessment Review," "Journal of Environmental Planning and Management," and "Sustainable Cities and Society" for research articles and publications in the field of environmental planning.</li> </ul> |  |
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### تقنيات التحسس النائي

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|----------------------------------------------|
| ١. اسم المقرر: المقرر : تقنيات التحسس النائي |
|                                              |
| ٢. رمز المقرر: RSST414                       |
|                                              |
| ٣. الفصل / السنة: 2026-2025                  |
| 2026-2025                                    |
| ٤. تاريخ إعداد هذا الوصف :                   |
| 2026-3-10                                    |

|                                                                                                                                                                                                                                                                                                                             |             |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|
| 5. أشكال الحضور المتاحة : حضور الزامي                                                                                                                                                                                                                                                                                       |             |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |
| حضور                                                                                                                                                                                                                                                                                                                        |             |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |
| 6. عدد الساعات الدراسية(الكلية)/ عدد الوحدات (الكلية): 60 ساعة / 2 وحدة                                                                                                                                                                                                                                                     |             |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |
| 7. اسم مسؤول المقرر الدراسي ( اذا اكثر من اسم يذكر)                                                                                                                                                                                                                                                                         |             |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |
| الاسم : ا د اسراء جميل محسن<br>Prof.Dr.Israa Jameel Muhsin<br>Email: <a href="mailto:israa.mohsen@sc.uobaghdad.edu.iq">israa.mohsen@sc.uobaghdad.edu.iq</a>                                                                                                                                                                 |             |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |
| 8. اهداف المقرر                                                                                                                                                                                                                                                                                                             |             |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |
| اعداد خريجين مختصين في التحسس النائي للمساهمة في تنمية<br>البلد .....<br>تلبية احتياجات قطاعات الدولة بكوادر ذات كفاءة عالية<br><input type="checkbox"/> تشجيع المتميزين للعمل في القسم<br>تشجيع البرامج البحثية و المشاركة في المؤتمرات و<br>الندوات العلمية<br><input type="checkbox"/> تحقيق الجودة و الاعتماد الاكاديمي |             |                                                                                                                   | تنمية مهارات الطالب العلمية والتطبيقية في المجالات التالية:<br>• إدراك الطالب لأهمية تقنيات التحسس النائي و أهمية استخدامها بالإضافة إلى المجالات التطبيقية التي يدخل فيها هذا الحقل.<br>• جعل الطالب قادرا على أن يكون باحثا في مجال الاستشعار عن بعد وكيفية تسخير هذه التقنيات وتوظيف ذلك في مجال تخصصه<br>• جعل الطالب قادرا على توظيف متغيرات التحسس النائي وكيفية استخدام النتائج المتحصلة من المختبر في القياس .<br>• تعليم الطالب كيفية الاستفادة من هذه التقنيات في الحياة العملية والوظيفية. |       |        |
| 9. استراتيجيات التعليم والتعلم                                                                                                                                                                                                                                                                                              |             |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |
| ادارة المحاضرة على نحو يشير الى اهمية الوقت<br>تكليف الطالب ببعض الواجبات الجماعية<br>مواقع الكترونية والصفوف الالكترونية<br>اسئلة مباشرة ونقاشات حول مضمون المحاضرة<br>ربط المفاهيم النظرية مع العملية.                                                                                                                    |             |                                                                                                                   | الاستراتيجية                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |        |
| 10. بنية المقرر                                                                                                                                                                                                                                                                                                             |             |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |
| طريقة التقييم                                                                                                                                                                                                                                                                                                               | ريقة التعلم | اسم الوحدة او الموضوع                                                                                             | مخرجات التعلم المطلوبة                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ساعات | أسبوع  |
| اسئلة عامة ومناقشة                                                                                                                                                                                                                                                                                                          | محاضرات     | -Remote sensing definition.<br>-satellite images<br>- true and false colors.                                      | General introduction about satellite image capture                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2     | الاول  |
| اسئلة عامة ومناقشة                                                                                                                                                                                                                                                                                                          | محاضرات     | 1.Preprocessing in remote<br>2.. Radiometric Calibration<br>3. Geometric Correction<br>4. Atmospheric Correction. | How to use preprocessing methods such as calibration and corrections.                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2     | الثاني |

|                    |         |                                                                                                                                                              |                                               |   |            |
|--------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---|------------|
| اسئلة عامة ومناقشة | محاضرات | -Noise reduction<br>-data fusion<br>-Cloud and Shadow Removal<br>- Mosaicking<br>-resampling<br>-data compression                                            | The types of preprocessing                    |   | الثالث     |
| اسئلة عامة ومناقشة | محاضرات | - Steps in Change Detection<br>-Types of Change Detection Techniques.<br>- Pixel-based Change Detection.                                                     | Principles of Change Detection                | 2 | الرابع     |
| اسئلة عامة ومناقشة | محاضرات | -Change Detection in Remote Sensing Using NDVI.<br>-urbanization effect on vegetation.<br>- Change Vector Analysis                                           | Application of change detection with examples | 2 | الخامس     |
| اسئلة عامة ومناقشة | محاضرات | Monthly Test                                                                                                                                                 | First theory test                             | 2 | السادس     |
| اسئلة عامة ومناقشة | محاضرات | -Vegetation Monitoring<br>-Land Use and Land Cover (LULC) Monitoring.<br>- Climate and Weather Monitoring.<br>- Hydrological and Water Resources Monitoring. | Monitoring techniques in remote sensing       | 2 | السابع     |
| امتحان اني         | محاضرات | - Urban Monitoring.<br>- Disaster Monitoring.<br>- Forest Monitoring.                                                                                        | Application in monitoring techniques          | 2 | الثامن     |
| اسئلة عامة ومناقشة | محاضرات | - Agricultural Monitoring.<br>- Coastal and Marine Monitoring.<br>- Air Quality and Pollution Monitoring                                                     | Other applicaton in monitoring methods        | 2 | التاسع     |
| امتحان شهري        | محاضرات | Monthly test                                                                                                                                                 | Second test                                   | 2 | العاشر     |
| اسئلة عامة ومناقشة | محاضرات | -important and types of classification.<br>Unsupervised classification types.<br>-k-mean algorithm.<br>-ISO data algorithm.                                  | Image classification techniques               | 2 | الحادي عشر |
| اسئلة عامة ومناقشة | محاضرات | -Supervised classification<br>-types of supervised classification.<br>-minimum distance classifier.<br>-maximum likelihood classifier.                       | Classification of image                       | 2 | الثاني عشر |
| اسئلة عامة ومناقشة | محاضرات | [updated 2025-2026]                                                                                                                                          | examples                                      | 2 | الثالث     |

|            |   |                                                 |                                |                    |
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| عشر        |   | استخدام برنامج البايثون في تقنيات التحسس النائي |                                |                    |
| الرابع عشر | 2 | Classification techniques                       | تدريب عملي على برنامج البايثون | محاضرات            |
| الخامس عشر | 2 | Discussion                                      | Review Course information      | محاضرات            |
|            |   |                                                 | اسئلة عامة ومناقشة             | اسئلة عامة ومناقشة |

|                                                                                                                                                               |                                                                                                                                                                                                                                          |
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| ١١. تقييم المقرر                                                                                                                                              |                                                                                                                                                                                                                                          |
| توزيع الدرجة من 40 كسعي على وفق المهام المكلف بها الطالب مثل التحضير اليومي والامتحانات اليومية والشهوية والشهرية والتحريرية والتقارير .... الخ والفايل من 60 |                                                                                                                                                                                                                                          |
| ١٢. مصادر التعلم والتدريس                                                                                                                                     |                                                                                                                                                                                                                                          |
| الكتب المقررة المطلوبة ( المنهجية أن وجدت )                                                                                                                   | -                                                                                                                                                                                                                                        |
| المراجع الرئيسية ( المصادر )                                                                                                                                  | - Schowengerdt, Robert A. (2007). <a href="#">Remote sensing: models and methods for image processing</a> (3rd ed.). Academic Press. p. 2. ISBN 978-0-12-369407-2. Archived from the original on 1 May 2016. Retrieved 15 November 2015. |
| الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير .... )                                                                                        | جميع البحوث المنشورة على مجلات سكوباس والمجلات المعتمدة                                                                                                                                                                                  |
| المراجع الإلكترونية ، مواقع الانترنت                                                                                                                          | <ul style="list-style-type: none"> <li>المواقع الالكترونية الرصينة.</li> <li>المكتبة الافتراضية.</li> <li>مواقع المكتبات في بعض الجامعات العالمية</li> </ul>                                                                             |

## الهيدروكيمياء

|                            |
|----------------------------|
| ١. اسم المقرر              |
| الهيدروكيمياء              |
| ٢. رمز المقرر              |
| RSHC410                    |
| ٣. الفصل / السنة 2024-2025 |
| الفصل الثاني/ 2025-2026    |
| ٤. تاريخ إعداد هذا الوصف   |
| 2026/3/10                  |
| 5. أشكال الحضور المتاحة    |
| حضور                       |

| 6. عدد الساعات الدراسية(الكلية)/ عدد الوحدات (الكلية)    |         |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                          |              |                    |
|----------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------|
| 4/4 ساعات                                                |         |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                          |              |                    |
| 7. اسم مسؤول المقرر الدراسي ( اذا اكثر من اسم يذكر)      |         |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                          |              |                    |
| الاسم:م د ايمان احمد محمدعليiman.ali@sc.uobaghdad.edu.iq |         |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                          |              |                    |
| الاسم :                                                  |         |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                          |              |                    |
| 8. اهداف المقرر                                          |         |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                          |              |                    |
| اهداف المادة الدراسية                                    |         |                                                                                                                                                                                         | <input type="checkbox"/> اعداد خريجين مختصين في التحسس النائي للمساهمة في تنمية البلد<br>تلبية احتياجات قطاعات الدولة بكوادر ذات كفاءة عالية<br><input type="checkbox"/> تشجيع المتميزين للعمل في القسم<br>تشجيع البرامج البحثية و المشاركة في المؤتمرات و الندوات العلمية<br><input type="checkbox"/> تحقيق الجودة و الاعتماد الاكاديمي |              |                    |
| 9. استراتيجيات التعليم والتعلم                           |         |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                          |              |                    |
| الاستراتيجية                                             |         |                                                                                                                                                                                         | <ul style="list-style-type: none"><li>ادارة المحاضرة على نحو يشير الى اهمية الوقت</li><li>تكليف الطالب ببعض الواجبات الجماعية</li><li>مواقع الكترونية والصفوف الالكترونية</li></ul>                                                                                                                                                      |              |                    |
| 10. بنية المقرر                                          |         |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                          |              |                    |
| الأسبوع                                                  | الساعات | مخرجات التعلم المطلوبة                                                                                                                                                                  | اسم الوحدة او الموضوع                                                                                                                                                                                                                                                                                                                    | طريقة التعلم | م                  |
| الاول                                                    | 2       | خلق جيل قادر على التعامل بحكمة مع الموارد المائية باعتبارها المصدر الأولي للحياة والتعرف على أهم العوامل المؤثرة على تلوث المياه. التعرف على المبادئ الأساسية لكيمياء المياه في العراق. | Introduction to hydrochemistry and water type classification                                                                                                                                                                                                                                                                             | محاضرات      | اسئلة عامة ومناقشة |
| الثاني                                                   |         | التعرف على اهم الوسائل الحديثة للتعرف على استعمالات الاراضي وتوزيع الملوثات فيها وتحديد مصدرها ومصيرها في كل من التربة والماء من خلال تطبيق تقنيات نظم المعلومات الجغرافية وبرامجياتها  | GIS Application in water management                                                                                                                                                                                                                                                                                                      | محاضرات      | اسئلة عامة ومناقشة |
| الثالث                                                   |         | التعرف على اهم التطبيقات والبرامجيات الخاصة بتقييم المياه والتعرف على نوعية المياه                                                                                                      | Types of plots commonly used to visualize water hydrochemistry                                                                                                                                                                                                                                                                           | محاضرات      | اسئلة عامة ومناقشة |
| الرابع                                                   |         | لتركيب الجزيئي للماء ليس كما هو موجود في الطبيعة كحالة محلول مائي ولكن دراسة                                                                                                            | .Water molecule geometry                                                                                                                                                                                                                                                                                                                 | محاضرات      | اسئلة عامة ومناقشة |

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|               |   |                                                                                                                                                                                                                                                                                                                                                        | المواد الكيميائية والصيغة<br>كيميائية والشكل الناتج من<br>ترابط هندسة مدارات<br>الإلكترون المشاركة في<br>الترابط |         |                    |
| الخامس        |   | التعرف على اوحداث<br>التركييب الكيميائية و يأخذ<br>هذا المفهوم في الاعتبار<br>الشحنة الأيونية ومتى تكون<br>مفيدة<br>دراسة النسب التي تتفاعل<br>بها المواد                                                                                                                                                                                              | Types of concentration<br>units                                                                                  | محاضرات | اسئلة عامة ومناقشة |
| السادس        |   | مراجعة                                                                                                                                                                                                                                                                                                                                                 | مراجعة                                                                                                           | محاضرات | اسئلة عامة ومناقشة |
| السابع        |   | امتحان شهري                                                                                                                                                                                                                                                                                                                                            | امتحان شهري                                                                                                      | محاضرات | اسئلة عامة ومناقشة |
| الثامن        | 4 | فهم الروابط بين نوعية المياه<br>والصحة في النمو ويسلط<br>الضوء على أزمات صحية<br>جديدة محتملة: من آثار<br>الأمراض المعدية الناجمة<br>عن الملوثات المعروفة<br>التركيز على المياه التي تتم<br>معالجتها من أجل قابليتها<br>لنقل، أو الاستخدام<br>الصناعي/المنزلي، أو<br>استعادة (البيئة/النظام البيئي،<br>بشكل عام من أجل صحة<br>الإنسان/الحياة المائية). | Water Quality and Uses                                                                                           | محاضرات | امتحان اني         |
| التاسع        | 4 | التعرف على اهم المشاكل<br>والمعوقات التي تعترض<br>عملية نمذجة المياه والتحليل<br>المتعلقة بجودتها                                                                                                                                                                                                                                                      | Problems related to<br>Water Sampling                                                                            | محاضرات | اسئلة عامة ومناقشة |
| العاشر        | 4 | دراسة المكونات غير<br>العضوية للمياه والتي يمكن<br>ان تؤثر على نوعه<br>واستخداماته للاغراض<br>المختلفة                                                                                                                                                                                                                                                 | Chemical Component<br>of water                                                                                   | محاضرات | امتحان شهري        |
| الحادي<br>عشر | 4 | التعرف على أبسط طرق<br>التحليل الكيميائي التي تقيس<br>العناصر الكيميائية دون<br>النظر إلى شكلها. أنتجت<br>البساطة النسبية لتحليل<br>العناصر كمية كبيرة من<br>بيانات العينات ومعايير جودة<br>المياه للعناصر.                                                                                                                                            | Chemical Analysis                                                                                                | محاضرات | اسئلة عامة ومناقشة |
| الثاني عشر    | 4 | امتحان                                                                                                                                                                                                                                                                                                                                                 | امتحان                                                                                                           | محاضرات | اسئلة عامة ومناقشة |

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| الثالث عشر | 4 | متابعة التقارير المطلوبة من الطلبة وتقييمهم عليها                              | محاضرات | اسئلة عامة ومناقشة |
| الرابع عشر | 4 | امتحان شهري                                                                    | محاضرات | اسئلة عامة ومناقشة |
| الخامس عشر | 4 | عمل برزنتيشن لكل مجموعة من الطلبة والقائه امام الطلبة وامتحانهم بالتقرير المعد | محاضرات | اسئلة عامة ومناقشة |

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| <b>١١. تقييم المقرر</b>                                                                                                                                       |                                                                                                                                                                                                                                        |
| توزيع الدرجة من 40 كسعي على وفق المهام المكلف بها الطالب مثل التحضير اليومي والامتحانات اليومية والشفوية والشهرية والتحريرية والتقارير .... الخ والفايل من 60 |                                                                                                                                                                                                                                        |
| <b>٩. مصادر التعلم والتدريس</b>                                                                                                                               |                                                                                                                                                                                                                                        |
| الكتب المقررة المطلوبة ( المنهجية أن وجدت )                                                                                                                   |                                                                                                                                                                                                                                        |
| المراجع الرئيسية ( المصادر )                                                                                                                                  | Todd, D.K., 1980<br>Hem J.D., 1971                                                                                                                                                                                                     |
| الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير .... )                                                                                        | Groundwater hydrology, 2 <sup>nd</sup> addition, John Wiley, NewYourk, pp. 535<br>Hem, J.D., 1985 Study and interpretation of chemical analysis of natural water, 3 <sup>rd</sup> addition, U.S.G.S. Water supply, paper pp. 2254, 263 |
| المراجع الإلكترونية ، مواقع الانترنت                                                                                                                          | معظم المواقع المتخصصة على الشبكة العنكبوتية مثل Google , Library Genesis , Scientific American ,Research Gate, Scholar الجديدة<br>والبرامج التي تنشر من خلال المواقع الإلكترونية المعتمدة لغرض انجاز تقارير الطلبة والتزود بالمعلومات. |

### المتحسسات والمفاهيم والتطبيقات

|                                                              |                   |
|--------------------------------------------------------------|-------------------|
| <b>١. اسم المقرر</b>                                         |                   |
| <b>المتحسسات والمفاهيم والتطبيقات</b>                        |                   |
| <b>٢. رمز المقرر</b>                                         |                   |
|                                                              | RSSF412           |
| <b>٣. الفصل / السنة</b>                                      |                   |
|                                                              | 2025-2024         |
| <b>٤. تاريخ إعداد هذا الوصف</b>                              |                   |
|                                                              | 2026/3/10         |
| <b>٥. أشكال الحضور المتاحة</b>                               |                   |
|                                                              | حضور              |
| <b>٦. عدد الساعات الدراسية(الكلية)/ عدد الوحدات (الكلية)</b> |                   |
|                                                              | 3 وحدات / 60 ساعه |

|                                                               |         |                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                          |         |                    |
|---------------------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------|
| 7. اسم مسؤول المقرر الدراسي ( اذا اكثر من اسم يذكر)           |         |                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                          |         |                    |
| الاسم: م.د.حسن جابر محمد<br>الاسم: ا.م.د.زهراء نجم عبد الامير |         |                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                          |         |                    |
| 8. اهداف المقرر                                               |         |                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                          |         |                    |
| اهداف المادة الدراسية                                         |         |                                                                                                                                                                                             | <input type="checkbox"/> اعداد خريجين مختصين في التحسس النائي للمساهمة في تنمية البلد<br>تلبية احتياجات قطاعات الدولة بكوادر ذات كفاءة عالية<br><input type="checkbox"/> تشجيع المتميزين للعمل في القسم<br>تشجيع البرامج البحثية و المشاركة في المؤتمرات و الندوات العلمية<br><input type="checkbox"/> تحقيق الجودة و الاعتماد الاكاديمي |         |                    |
| 9. استراتيجيات التعليم والتعلم                                |         |                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                          |         |                    |
| الاستراتيجية                                                  |         |                                                                                                                                                                                             | <ul style="list-style-type: none"><li>• ادارة المحاضرة على نحو يشير الى اهمية الوقت</li><li>• تكليف الطالب ببعض الواجبات الجماعية</li><li>• مواقع الكترونية والصفوف الالكترونية</li></ul>                                                                                                                                                |         |                    |
| 10. بنية المقرر                                               |         |                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                          |         |                    |
| الأسبوع                                                       | الساعات | مخرجات التعلم المطلوبة                                                                                                                                                                      | اسم الوحدة او الموضوع                                                                                                                                                                                                                                                                                                                    | التعداد | طريقة التقييم      |
| الاول                                                         | 2       | التعريف بالمتحسسات والية عملها وانواعها                                                                                                                                                     | المتحسسات :وانواعها                                                                                                                                                                                                                                                                                                                      | محاضرات | اسئلة عامة ومناقشة |
| الثاني                                                        | 2       | شرح لمفهوم المتحسس النشط الفعال و طريقة عمله                                                                                                                                                | المتحسسات الفعالة او النشطة                                                                                                                                                                                                                                                                                                              | محاضرات | اسئلة عامة ومناقشة |
| الثالث                                                        | 2       | شرح لمفهوم المتحسس السلبي                                                                                                                                                                   | المتحسسات السلبية وانواعها                                                                                                                                                                                                                                                                                                               | محاضرات | اسئلة عامة ومناقشة |
| الرابع                                                        | 2       | هناك العديد من الحساسات التي تؤدي نفس المهمة ولنقل قياس درجة الحرارة. عبر معرفة خصائص هذه الحساسات وأدائها والتطبيق المراد استخدامها فيه تُصبح قادرين على اختيار الحساس الأمثل لهذا التطبيق | خصائص الحساسات ومتطلبات العمل                                                                                                                                                                                                                                                                                                            | محاضرات | اسئلة عامة ومناقشة |
| الخامس                                                        | 2       | امتحان                                                                                                                                                                                      | امتحان                                                                                                                                                                                                                                                                                                                                   | محاضرات | اسئلة عامة ومناقشة |
| السادس                                                        | 2       | الية عمل المتحسس الحراري ومبدأ عمله                                                                                                                                                         | المتحسس الحراري                                                                                                                                                                                                                                                                                                                          | محاضرات | اسئلة عامة ومناقشة |
| السابع                                                        | 2       | الية عمل المتحسس الدخاني ومبدأ عمله                                                                                                                                                         | المتحسس الدخاني                                                                                                                                                                                                                                                                                                                          | محاضرات | اسئلة عامة ومناقشة |
| الثامن                                                        | 2       | الية عمل المتحسس المسافة ومبدأ عمله                                                                                                                                                         | متحسس المسافة                                                                                                                                                                                                                                                                                                                            | محاضرات | امتحان اني         |
| التاسع                                                        | 2       | الية عمل المتحسس الحركي ومبدأ عمله                                                                                                                                                          | متحسس الحركة                                                                                                                                                                                                                                                                                                                             | محاضرات | اسئلة عامة ومناقشة |
| العاشر                                                        | 2       | الية عمل المتحسس المحتوى الرطوبي ومبدأ عمله                                                                                                                                                 | متحسس المحتوى الرطوبي للتربة                                                                                                                                                                                                                                                                                                             | محاضرات | امتحان شهري        |
| الحادي عشر                                                    | 2       | الية عمل المتحسس الرطوبة ومبدأ عمله                                                                                                                                                         | متحسس الرطوبة                                                                                                                                                                                                                                                                                                                            | محاضرات | اسئلة عامة ومناقشة |
| الثاني عشر                                                    | 2       | الية عمل المتحسس الغازات ومبدأ عمله                                                                                                                                                         | متحسس الغازات                                                                                                                                                                                                                                                                                                                            | محاضرات | اسئلة عامة ومناقشة |

|                                                   |                          |         |                    |            |
|---------------------------------------------------|--------------------------|---------|--------------------|------------|
| عمله                                              |                          |         |                    |            |
| الآلة عمل المتحسس المطري ومبدأ عمله               | متحسس المطر              | محاضرات | اسئلة عامة ومناقشة | الثالث عشر |
| الآلة عمل المتحسس للموجات فوق الصوتية ومبدأ عملها | متحسس الموجات الصوتية    | محاضرات | اسئلة عامة ومناقشة | الرابع عشر |
| امتحان                                            | امتحان نهاية الفصل الاول | محاضرات | اسئلة عامة ومناقشة | الخامس عشر |

|                                                                                                                                                                |                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ١١. تقييم المقرر                                                                                                                                               |                                                                                                                                                              |
| توزيع الدرجة من 40 كسعي على وفق المهام المكلف بها الطالب مثل التحضير اليومي والامتحانات اليومية والشفوية والشهرية والتحريرية والتقارير .... الخ والفائيل من 60 |                                                                                                                                                              |
| ١٢. مصادر التعلم والتدريس                                                                                                                                      |                                                                                                                                                              |
| الكتب المقررة المطلوبة ( المنهجية أن وجدت )                                                                                                                    | SENSORS ,williams 2 <sup>nd</sup> edition 2004                                                                                                               |
| المراجع الرئيسية ( المصادر )                                                                                                                                   | Sensors ,Davidson ,new york 2015                                                                                                                             |
| الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير .... )                                                                                         | جميع البحوث المنشورة على مجلات سكوبس والمجلات المعتمدة                                                                                                       |
| المراجع الإلكترونية ، مواقع الانترنت                                                                                                                           | <ul style="list-style-type: none"> <li>المواقع الالكترونية الرصينة.</li> <li>المكتبة الافتراضية.</li> <li>مواقع المكتبات في بعض الجامعات العالمية</li> </ul> |

## الاستشعار عن بعد في علوم الارض

|                                                              |                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13. اسم المقرر                                               | الاستشعار عن بعد في علوم الارض                                                                                                                                                                                                                                                                                  |
| 14. رمز المقرر                                               | RSEA402                                                                                                                                                                                                                                                                                                         |
| 15. فصلي / سنوي                                              | فصل ثاني / مرحلة ثانية                                                                                                                                                                                                                                                                                          |
| 16. تاريخ إعداد الوصف:                                       | 2026-3-10                                                                                                                                                                                                                                                                                                       |
| 17. نماذج الحضور المتاحة:                                    | اسبوعي                                                                                                                                                                                                                                                                                                          |
| 18. عدد الساعات المعتمدة (الإجمالي) / عدد الوحدات (الإجمالي) | (60) ساعة / (3) وحدة                                                                                                                                                                                                                                                                                            |
| 19. اسم مسؤول المقرر                                         | اسم: م.د. منى حسين احمد<br>muna.h@sc.uobaghdad.edu.iq                                                                                                                                                                                                                                                           |
| 20. اهداف المقرر                                             | <ul style="list-style-type: none"> <li>تزويد الطلاب بالتعرض لاكتساب المعرفة حول المفاهيم والتطبيقات مما يؤدي إلى نمذجة إدارة موارد الأرض باستخدام الاستشعار عن بعد</li> <li>اكتساب المهارات المتقدمة في التقنيات مثل الطيفية الفائقة والحرارية والليدار</li> <li>المسح لرسم الخرائط والنمذجة والرصد.</li> </ul> |

| 21. استراتيجيات التدريس والتعلم                                                                                                                                                                                                                                                                                                                 |         |                                                                            |                                                                                                              |                                                                                                                                                                                                                             |                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• تكليف الطلبة بتنفيذ مشاريع بحثية تطبيقية باستخدام ArcGIS</li> <li>• تقسيم الطلبة الى مجموعات عمل صغيرة لتحليل البيانات الفضائية ومناقشة النتائج</li> <li>• تحفيز الطلبة لطرح الاسئلة العملية واستكشاف الاجابات من خلال البحث والتحليل</li> <li>• تحليل حالات واقعية مثل التصحر او الفيضانات</li> </ul> |         |                                                                            |                                                                                                              |                                                                                                                                                                                                                             |                                                           |
| 22. هيكل المقرر                                                                                                                                                                                                                                                                                                                                 |         |                                                                            |                                                                                                              |                                                                                                                                                                                                                             |                                                           |
| الاسبوع                                                                                                                                                                                                                                                                                                                                         | الساعات | مخرجات التعلم المطلوبة                                                     | اسم او عنوان الوحدة                                                                                          | طريقة التعلم                                                                                                                                                                                                                | طريقة التقييم                                             |
| 1                                                                                                                                                                                                                                                                                                                                               | 2       | التعريف بالاستشعار عن بعد                                                  | تعريف الاستشعار عن بعد<br>خصائص ومميزات الهدف<br>المدرس<br>Energy Interaction<br>with the Earth's<br>Surface | عرض<br>المحاضرة<br>باستخدام<br>السيورة او<br>استخدام جهاز<br>عرض البيانات<br>او شاشة التلفاز<br>وكذلك قناة<br>تعليمية في<br>YouTube<br>لرفع الفيديوات<br>فيها<br>او عرض<br>المحاضرات من<br>خلال منصة<br>(كوكل كلاس<br>رووم) | اختبارات<br>حضورية تحريرية<br>وشفهية والواجبات<br>البيتية |
| 2                                                                                                                                                                                                                                                                                                                                               | 2       | GIS تطبيقات<br>نموذج تحليل الانهيارات<br>الأرضية                           | Application of a<br>weighted spatial<br>probability<br>model in GIS to<br>analyses landslides                | =                                                                                                                                                                                                                           | =                                                         |
| 3                                                                                                                                                                                                                                                                                                                                               | 2       | معاملات حساب<br>الاوزان والتحقق من<br>النتائج لخرائط<br>الانزلاقات الارضية | Landslide<br>susceptibility mapping<br>A weight calculation<br>and verification                              | =                                                                                                                                                                                                                           | =                                                         |
| 4                                                                                                                                                                                                                                                                                                                                               | 2       | الجيولوجيا                                                                 | العامية الجيولوجيا<br>والجيوفيزياء<br>وهيدرولوجيا المياه<br>الجيولوجيا الزراعية                              | =                                                                                                                                                                                                                           | =                                                         |
| 5                                                                                                                                                                                                                                                                                                                                               | 2       | تطبيقات عملية بمفاهيم<br>التحسس النائي في علوم<br>الأرض                    | Use of GIS and<br>Remote Sensing to<br>evaluate the<br>Desertification                                       | =                                                                                                                                                                                                                           | =                                                         |
| 6                                                                                                                                                                                                                                                                                                                                               | 2       | تطبيقات عملية<br>المعاملات المطلوبة<br>لدراسة خرائط المناطق                | Mapping<br>Environmentally<br>Sensitive Areas to                                                             | =                                                                                                                                                                                                                           | =                                                         |

|   |   |                                                   |                                               |   |    |
|---|---|---------------------------------------------------|-----------------------------------------------|---|----|
|   |   | Desertification                                   | الحساسية للتصحّر                              |   |    |
| = | = | Natural Resource Management                       | اهمية التحسس النائي في ادارة المصادر الطبيعية | 2 | 7  |
| = | = | امتحان                                            | امتحان                                        | 2 | 8  |
| = | = | Creating a surface with geostatistical techniques | تطبيق تقنيات التخمين الإحصائي المكاني         | 2 | 9  |
| = | = | Using analytical tools when generating surfaces   | مسائل عن حساب الإشارة الناتجة من عملية الطي   | 2 | 10 |
| = | = | دراسة الطبقات والفوالق والفواصل                   | التراكيب الجيولوجيا                           | 2 | 11 |
| = | = | Modeling spatial problems                         | المشاكل المصاحبة لتطبيقات الموديلات المكانية  | 2 | 12 |
| = | = | تطبيقات نظم المعلومات الجغرافية في ادارة الكوارث  | ادارة الازمات والكوارث باستخدام GIS           | 2 | 13 |
| = | = | مراجعة                                            | مراجعة                                        | 2 | 14 |
|   |   | امتحان                                            | امتحان                                        |   | 15 |

## 23. تقييم المقرر

يتم توزيع الدرجات من 100

## 24. مصادر التدريس والتعلم

|                                                                                                        |                                                                 |
|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Manual of Remote Sensing, Vol. 3: Remote Sensing for the Earth Sciences                                | الكتب المقررة المطلوبة                                          |
| Remote Sensing Intelligent Interpretation for Geology<br>Weitao Chen, Xianju Li, Xuwen Qin, Lizhe Wang | المراجع الرئيسية (المصادر)                                      |
| جميع البحوث المنشورة على مجلات سكوباس والمجلات المعتمدة                                                | الكتب والمراجع التي يوصى بها (المجلات العلمية، التقارير، .....) |
| جميع النشرات الجديدة والبرامج التي تنشر من خلال المواقع الإلكترونية المعتمدة.                          | المراجع الإلكترونية، مواقع الانترنت، .....                      |

**المرحلة الثالثة (الفصل الاول)**

## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

| Module Information                 |                   |                      |                                                                                                                                                                                                                                                     |
|------------------------------------|-------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية            |                   |                      |                                                                                                                                                                                                                                                     |
| Module Title                       | <b>Geophysics</b> |                      | Module Delivery                                                                                                                                                                                                                                     |
| Module Type                        | <b>core</b>       |                      | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code                        | <b>UOBR51</b>     |                      |                                                                                                                                                                                                                                                     |
| ECTS Credits                       | <b>6</b>          |                      |                                                                                                                                                                                                                                                     |
| SWL (hr/sem)                       | <b>150</b>        |                      |                                                                                                                                                                                                                                                     |
| Module Level                       |                   | Semester of Delivery |                                                                                                                                                                                                                                                     |
|                                    |                   | 5                    |                                                                                                                                                                                                                                                     |
| Administering Department           |                   | Type Dept. Code      | College                                                                                                                                                                                                                                             |
|                                    |                   |                      | Type College Code                                                                                                                                                                                                                                   |
| Module Leader                      | نجاح عبد الحسن    |                      | e-mail                                                                                                                                                                                                                                              |
|                                    |                   |                      | E-mail                                                                                                                                                                                                                                              |
| Module Leader's Acad. Title        |                   | Assistant Professor  | Module Leader's Qualification                                                                                                                                                                                                                       |
|                                    |                   |                      | Ph.D.                                                                                                                                                                                                                                               |
| Module Tutor                       |                   |                      | e-mail                                                                                                                                                                                                                                              |
|                                    |                   |                      | E-mail                                                                                                                                                                                                                                              |
| Peer Reviewer Name                 |                   | حسن جابر             | e-mail                                                                                                                                                                                                                                              |
|                                    |                   |                      | E-mail                                                                                                                                                                                                                                              |
| Scientific Committee Approval Date |                   | 01/10/2025           | Version Number                                                                                                                                                                                                                                      |
|                                    |                   |                      | 1.0                                                                                                                                                                                                                                                 |

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                      |      |          |  |
|----------------------|------|----------|--|
| Prerequisite module  | None | Semester |  |
| Co-requisites module | None | Semester |  |

### Module Aims, Learning Outcomes and Indicative Contents

## أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>       | <ul style="list-style-type: none"> <li>- Understand the fundamental principles of geophysics, including the physical properties of Earth materials and the methods used to measure them.</li> <li>- Develop knowledge of the main geophysical techniques used to investigate the Earth's internal structure, such as seismic reflection and refraction, gravity and magnetic surveys, and electrical and electromagnetic methods.</li> <li>- Learn how to interpret geophysical data and use it to infer subsurface structures and properties, such as the location and geometry of geological formations or the properties of hydrocarbon reservoirs.</li> <li>- Understand the limitations and uncertainties associated with geophysical data and their interpretation, and learn how to critically evaluate geophysical results.</li> <li>- Develop skills in data acquisition, processing, and analysis, including the use of specialized software and equipment.</li> <li>- Learn how geophysics can be applied to a wide range of fields, including mineral exploration, environmental studies, geohazard assessment, and petroleum exploration.</li> <li>- Understand the ethical and professional responsibilities associated with geophysics, including issues related to safety, data quality, and environmental impact.</li> <li>- Develop skills in scientific communication, including the ability to present geophysical data and results in written and oral formats to a range of audiences, including both technical and non-technical stakeholders.</li> <li>- Gain an appreciation for the interdisciplinary nature of geophysics and its connections to other fields, such as geology, physics, mathematics, and engineering.</li> <li>- Understand the importance of ongoing learning and professional development in geophysics, and be able to identify opportunities for further education and training in the field.</li> </ul> |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة</p> | <ol style="list-style-type: none"> <li>1. Students will be able to explain the fundamental principles of geophysics, including the physical properties of Earth materials and the methods used to measure them.</li> <li>2. Students will be able to apply the main geophysical techniques used to investigate the Earth's internal structure, such as seismic reflection and refraction, gravity and magnetic surveys, and electrical and electromagnetic methods.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| الدراسية                                          | <ol style="list-style-type: none"> <li>Students will be able to interpret geophysical data and use it to infer subsurface structures and properties, such as the location and geometry of geological formations or the properties of hydrocarbon reservoirs.</li> <li>Students will be able to evaluate the limitations and uncertainties associated with geophysical data and their interpretation, and critically assess geophysical results. Students will be able to acquire, process, and analyze geophysical data using specialized software and equipment.</li> <li>Students will be able to apply geophysics to a wide range of fields, including mineral exploration, environmental studies, geohazard assessment, and petroleum exploration.</li> <li>Students will be able to identify and discuss ethical and professional responsibilities associated with geophysics, including issues related to safety, data quality, and environmental impact.</li> <li>Students will be able to communicate geophysical data and results in written and oral formats to a range of audiences, including both technical and non-technical stakeholders.</li> <li>Students will be able to appreciate the interdisciplinary nature of geophysics and its connections to other fields, such as geology, physics, mathematics, and engineering.</li> <li>Students will be able to identify opportunities for further education and training in geophysics, and demonstrate a commitment to ongoing learning and professional development in the field.</li> </ol>                                                                                                                                                                                                                                                                                                                                                     |
| <b>Indicative Contents</b><br>المحتويات الإرشادية | <ol style="list-style-type: none"> <li>Introduction to geophysics: Earth's structure and physical properties, history of geophysics, and the role of geophysics in understanding the Earth.</li> <li>Seismology: seismic waves, wave propagation, seismic data acquisition and processing, seismic imaging, and interpretation techniques.</li> <li>Gravity and magnetics: principles of gravity and magnetic surveys, data acquisition and processing, interpretation techniques, and applications in mineral exploration and geohazard assessment.</li> <li>Electrical and electromagnetic methods: principles of electrical and electromagnetic surveys, data acquisition and processing, interpretation techniques, and applications in mineral exploration, environmental studies, and geohazard assessment.</li> <li>Geophysical borehole logging: principles of borehole geophysics, data acquisition and processing, interpretation techniques, and applications in petroleum exploration and environmental studies.</li> <li>Geophysical data integration: combining geophysical data with geological, petrophysical, and other information to generate a comprehensive subsurface model.</li> <li>Geophysical inverse theory: mathematical methods used to invert geophysical data and generate subsurface models.</li> <li>Geophysical modeling: numerical models of geophysical processes and their use in interpretation and exploration.</li> <li>Geophysical case studies: examples of geophysical studies in mineral exploration, petroleum exploration, environmental studies, and geohazard assessment.</li> <li>Professional and ethical considerations: safety, data quality, environmental impact, and ethical considerations in geophysical studies.</li> <li>Future directions in geophysics: emerging technologies and techniques, and the future of geophysics as a discipline.</li> </ol> |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strategies | <ol style="list-style-type: none"> <li>1. Lectures: In-class lectures can be used to introduce new concepts, theories, and methods in geophysics. Lectures can also be used to provide context and background information for geophysical case studies and research projects.</li> <li>2. Laboratory exercises: Hands-on laboratory exercises can give students experience in acquiring, processing, and interpreting geophysical data. These exercises can be conducted using physical models, computer simulations, or real-world data sets.</li> <li>3. Fieldwork: Field trips can give students an opportunity to observe geophysical phenomena first-hand and see how geophysical methods are used in real-world applications. Fieldwork can also provide an opportunity for students to practice geophysical data acquisition techniques.</li> <li>4. Case studies: Geophysical case studies can be used to illustrate how geophysical methods are applied in specific contexts, such as mineral exploration, petroleum exploration, environmental studies, and geohazard assessment. Case studies can also be used to demonstrate the limitations and uncertainties associated with geophysical data and their interpretation.</li> <li>5. Group projects: Group projects can give students experience in working collaboratively and applying geophysical methods to real-world problems. Projects can be designed to address specific research questions or to demonstrate the use of geophysical methods in a particular application.</li> <li>6. Guest lectures: Inviting guest speakers who are experts in specific areas of geophysics can provide students with insights into the current state of research and development in the field. Guest lectures can also expose students to a range of perspectives and approaches to geophysical problems.</li> <li>7. Online resources: Online resources such as videos, simulations, and interactive tutorials can be used to supplement in-class lectures and provide students with opportunities for self-directed learning.</li> <li>8. Assessment: Assessment tools such as quizzes, exams, laboratory reports, and research papers can be used to assess students' understanding of geophysical concepts and their ability to apply geophysical methods to real-world problems. These assessments can be used to provide feedback to students and to guide future instruction.</li> </ol> |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Student Workload (SWL)

### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |  |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |     | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |     | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |  |

## Module Evaluation

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|               | Material Covered                                                                                                                                      |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b> | Introduction to geophysics<br>- Definition, history, and scope of geophysics<br>- Physical properties of rocks and minerals                           |
| <b>Week 2</b> | Seismic methods<br>- Seismic waves and their propagation<br>- Seismic reflection, refraction, and tomography                                          |
| <b>Week 3</b> | Gravity and magnetic methods<br>- Gravity anomaly, Bouguer anomaly, and isostasy<br>- Magnetic anomaly, magnetic susceptibility, and magnetic mapping |
| <b>Week 4</b> | Electromagnetic methods<br>- Electrical resistivity, induced polarization, and magnetotellurics<br>- Applications of electromagnetic methods          |
| <b>Week 5</b> | Geophysical data acquisition<br>- Field instrumentation, data recording, and quality control<br>- Geophysical field survey planning                   |

|                |                                                                                                                                                                                                                                                                                                       |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 6</b>  | <p>Geophysical data processing</p> <ul style="list-style-type: none"> <li>- Filtering, deconvolution, and velocity analysis</li> <li>- Data visualization and interpretation</li> </ul>                                                                                                               |
| <b>Week 7</b>  | <p>Geophysical data interpretation</p> <ul style="list-style-type: none"> <li>- Data modeling, inversion, and integration with geological data</li> <li>- Applications of geophysical interpretation to natural resource exploration, engineering, and environmental site characterization</li> </ul> |
| <b>Week 8</b>  | Mid Term Exam.                                                                                                                                                                                                                                                                                        |
| <b>Week 9</b>  | <p>Seismic imaging</p> <ul style="list-style-type: none"> <li>- 2D and 3D seismic imaging</li> <li>- Seismic attribute analysis</li> </ul>                                                                                                                                                            |
| <b>Week 10</b> | <p>Gravity and magnetic interpretation</p> <ul style="list-style-type: none"> <li>- Forward modeling and inversion</li> <li>- Applications to mineral exploration and natural resource mapping</li> </ul>                                                                                             |
| <b>Week 11</b> | <p>Electromagnetic interpretation</p> <ul style="list-style-type: none"> <li>- Forward modeling and inversion</li> <li>- Applications to groundwater exploration and environmental site characterization</li> </ul>                                                                                   |
| <b>Week 12</b> | <p>Geophysical case studies</p> <ul style="list-style-type: none"> <li>- Real-world examples of geophysical surveys and their interpretation in different geological settings</li> <li>- Industry partnerships and case studies</li> </ul>                                                            |
| <b>Week 13</b> | <p>Ethics and social responsibility in geophysics</p> <ul style="list-style-type: none"> <li>- Environmental impact assessment, community engagement, and responsible data management</li> <li>- Emerging issues and trends in geophysics</li> </ul>                                                  |
| <b>Week 14</b> | <p>Geophysical project work</p> <ul style="list-style-type: none"> <li>- Students will design and execute a geophysical survey, process and interpret the data, and present their findings in a report or presentation</li> </ul>                                                                     |
| <b>Week 15</b> | <p>Course review and exam preparation</p> <ul style="list-style-type: none"> <li>- Review of key concepts and theories covered in the course</li> <li>- Exam preparation and study tips</li> </ul>                                                                                                    |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                                                                                                                                                                                                                         |

| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي العملي |                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                        | Material Covered                                                                                                                                                                                                                                        |
| Week 1                                                                 | Introduction to geophysical data processing software <ul style="list-style-type: none"> <li>• Introduction to data processing software such as SeisImager/SU, Oasis Montaj, and EMIGMA</li> <li>• Basic data input/output, and visualization</li> </ul> |
| Week 2                                                                 | Seismic data processing <ul style="list-style-type: none"> <li>- Seismic data filtering, deconvolution, and velocity analysis</li> <li>- Seismic data imaging and interpretation</li> </ul>                                                             |
| Week 3                                                                 |                                                                                                                                                                                                                                                         |
| Week 4                                                                 |                                                                                                                                                                                                                                                         |
| Week 5                                                                 |                                                                                                                                                                                                                                                         |
| Week 6                                                                 |                                                                                                                                                                                                                                                         |
| Week 7                                                                 |                                                                                                                                                                                                                                                         |
| Week 8                                                                 |                                                                                                                                                                                                                                                         |
| Week 9                                                                 |                                                                                                                                                                                                                                                         |
| Week 10                                                                |                                                                                                                                                                                                                                                         |
| Week 11                                                                |                                                                                                                                                                                                                                                         |
| Week 12                                                                |                                                                                                                                                                                                                                                         |
| Week 13                                                                |                                                                                                                                                                                                                                                         |
| Week 14                                                                |                                                                                                                                                                                                                                                         |
| Week 15                                                                |                                                                                                                                                                                                                                                         |
| Week 16                                                                | Preparatory week before the final Exam                                                                                                                                                                                                                  |

| <b>Learning and Teaching Resources</b><br>مصادر التعلم والتدريس |      |                          |
|-----------------------------------------------------------------|------|--------------------------|
|                                                                 | Text | Available in the Library |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |
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|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ?  |
| <b>Required Texts</b>    | <ol style="list-style-type: none"> <li>1. "Exploration Seismology" by R.E. Sheriff and L.P. Geldart: This classic textbook covers the principles and methods of seismic exploration, including seismic wave propagation, data acquisition, processing, and interpretation.</li> <li>2. "Introduction to Geophysical Prospecting" by M.B. Dobrin and C.H. Savit: This textbook provides an overview of geophysical methods used in mineral, petroleum, and environmental exploration, including gravity, magnetic, electrical, electromagnetic, and seismic methods.</li> <li>3. "Inverse Theory and Applications in Geophysics" by M.A. Menke: This textbook covers the mathematical theory and computational methods used to invert geophysical data and generate subsurface models.</li> <li>4. "Geophysics for Petroleum Engineers" by F.A. McMechan: This textbook provides an introduction to geophysical methods used in petroleum exploration and production, including seismic, gravity, magnetic, and electromagnetic methods.</li> <li>5. "Introduction to Applied Geophysics" by W. Telford, L.P. Geldart, R.E. Sheriff, and D.A. Keys: This textbook provides an introduction to the principles and methods of geophysics, including seismic, gravity, magnetic, electrical, and electromagnetic methods, as well as applications in mineral exploration, environmental studies, and geohazard assessment.</li> </ol>                                                                  | No |
| <b>Recommended Texts</b> | <ol style="list-style-type: none"> <li>1. "Geophysical Data Analysis: Discrete Inverse Theory" by William Menke: This textbook covers the mathematical theory and computational methods used to invert geophysical data and generate subsurface models.</li> <li>2. "Applied Geophysics" by W.M. Telford, L.P. Geldart, and R.E. Sheriff: This textbook provides an introduction to the principles and methods of geophysics, including seismic, gravity, magnetic, electrical, and electromagnetic methods, as well as applications in mineral exploration, environmental studies, and geohazard assessment.</li> <li>3. "Introduction to Seismology" by Peter M. Shearer: This textbook provides an in-depth introduction to the principles and methods of seismology, including seismic wave propagation, data acquisition, processing, and interpretation.</li> <li>4. "Geophysics in the Affairs of Man: A Personalized History of Exploration Geophysics" by L.C. Pakiser and V.F. Hollister: This book provides a historical overview of the development of geophysics and its applications in mineral exploration, petroleum exploration, environmental studies, and geohazard assessment.</li> <li>5. "Geophysics for the Mineral Exploration Geoscientist" by Michael Dentith and Stephen T. Mudge: This textbook provides an introduction to geophysical methods used in mineral exploration, including gravity, magnetic, electrical, electromagnetic, and seismic methods.</li> </ol> | No |

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Websites | <ul style="list-style-type: none"> <li>MIT OpenCourseWare - Geophysics: <a href="https://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-340-geophysics-spring-2004/">https://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-340-geophysics-spring-2004/</a><br/>MIT offers free access to course materials for their geophysics course including video lectures, lecture notes, problem sets, exams, and readings.</li> <li>Stanford Exploration Project - Geophysics 101: <a href="https://sepwww.stanford.edu/public/docs/sep101/">https://sepwww.stanford.edu/public/docs/sep101/</a><br/>SEP offers free educational materials for geophysics including a digital course book, video lectures, exercises, and more. Covering various topics in geophysics.</li> <li>OpenGeophysics.org: <a href="http://opengeophysics.org/CourseMaterials">http://opengeophysics.org/CourseMaterials</a><br/>OpenGeophysics provides freely available lectures, reading materials, and tutorials Coursera Courses in Geophysics: <a href="https://www.coursera.org/courses?query=geophysics">https://www.coursera.org/courses?query=geophysics</a></li> <li>Coursera offers several Massive Open Online Courses (MOOCs) in geophysics. Though the courses themselves require registration, you can often access the course materials like readings and videos without paying.</li> <li>Kansas Geological Survey - Basic Geophysics: <a href="http://www.kgs.ku.edu/Extension/geophysics/basic.html">http://www.kgs.ku.edu/Extension/geophysics/basic.html</a><br/>They offer free PDF materials covering basic concepts in geophysics and geophysical method</li> </ul> |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Grading Scheme                                                                                                                                                                                                                                                                                                                                                                       |                  |                     |          |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|----------|---------------------------------------|
| مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                                         |                  |                     |          |                                       |
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade            | التقدير             | Marks %  | Definition                            |
| Success Group<br>(50 - 100)                                                                                                                                                                                                                                                                                                                                                          | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)                                                                                                                                                                                                                                                                                                                                                               | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                                                                                                                                                                                                                                                                                                                                                                      |                  |                     |          |                                       |
| <b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |                  |                     |          |                                       |

| Module Information                 |                                               |                      |                               |                                                                                                                                                                                                                                                     |
|------------------------------------|-----------------------------------------------|----------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية            |                                               |                      |                               |                                                                                                                                                                                                                                                     |
| Module Title                       | Analysis and interpretation of spatial images |                      |                               | Module Delivery                                                                                                                                                                                                                                     |
| Module Type                        | Core                                          |                      |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code                        | UOBR52                                        |                      |                               |                                                                                                                                                                                                                                                     |
| ECTS Credits                       | 7                                             |                      |                               |                                                                                                                                                                                                                                                     |
| SWL (hr/sem)                       | 175                                           |                      |                               |                                                                                                                                                                                                                                                     |
| Module Level                       | 3                                             | Semester of Delivery | 5                             |                                                                                                                                                                                                                                                     |
| Administering Department           | Type Dept. Code                               | College              | Type College Code             |                                                                                                                                                                                                                                                     |
| Module Leader                      | بشرى علي احمد                                 |                      | e-mail                        | E-mail                                                                                                                                                                                                                                              |
| Module Leader's Acad. Title        | Assistant Professor                           |                      | Module Leader's Qualification | Ph.D.                                                                                                                                                                                                                                               |
| Module Tutor                       | Name (if available)                           |                      | e-mail                        | E-mail                                                                                                                                                                                                                                              |
| Peer Reviewer Name                 | Name                                          |                      | e-mail                        | E-mail                                                                                                                                                                                                                                              |
| Scientific Committee Approval Date | 01/10/2025                                    |                      | Version Number                | 1.0                                                                                                                                                                                                                                                 |

| Relation with other Modules       |                                               |          |   |
|-----------------------------------|-----------------------------------------------|----------|---|
| العلاقة مع المواد الدراسية الأخرى |                                               |          |   |
| Prerequisite module               | Analysis and interpretation of spatial images | Semester | 1 |
| Co-requisites module              | None                                          | Semester |   |

| Module Aims, Learning Outcomes and Indicative Contents   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Module Objectives</b><br>أهداف المادة الدراسية        | Here are some learning objectives for a course on Analysis and interpretation of spatial images :<br>1. Interpretation of Satellite Imageries Interpretation is the process of extraction of qualitative and quantitative information of objects from satellite images.<br>2. To derive useful spatial information from images is the task of image interpretation.<br>3. Detection and Identification: recognition of certain target. A simple example is to identify vegetation types, soil types, rock types and water bodies. The higher the spatial / spectral resolution of an image, the more detail we can derive from the image. |

|                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                      | <ol style="list-style-type: none"> <li>4. Delineation: to outline the recognized target for mapping purposes. Identification and delineation combined together are used to map certain subjects. If the whole image is to be processed by these two procedures, we call it image classification.</li> <li>5. Enumeration: to count certain phenomena from the image. This is done based on detection and identification. For example, we can count the number of various residential units.</li> <li>6. Mensuration: to measure the area, the volume, the amount, and the length of certain target from an image. This often involves all the procedures mentioned above. Simple examples include measuring the length of a river and the acreage of a specific land-cover class. More complicated examples include an estimation of timber volume, river discharge, crop productivity, river basin radiation and evapotranspiration.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Module Learning Outcomes</b><br><br>مخرجات التعلم للمادة الدراسية | <p>After completing a course on Analysis and interpretation of spatial images , students should be able to:</p> <ol style="list-style-type: none"> <li>1. Be able to locate sources of technical information about satellites and applications</li> <li>2. Perform a range of key digital image analyses using specialist software.</li> <li>3. Interpret the information provided by digital imagery for a range of applications and prepare reports that incorporate outputs from digital image analysis software.</li> <li>4. Understand remote sensing workflow including image acquisition, (pixel-based) image analysis, classification and validation.</li> <li>5. Get to know online portals, data catalogues, and pricing schemes for satellite data.</li> <li>6. Familiarize with the European Copernicus Earth observation programmer.</li> <li>7. Master standard image analysis routines as implemented in ArcGIS Pro.</li> <li>8. Explain image analysis techniques to inform the interpretation and enhancement of remote sensing datasets.</li> <li>9. Apply analysis techniques on remote sensing datasets to solve environmental and social problems that require spatial solutions</li> <li>10. Operate remote sensing software to produce enhanced spatial information from basic datasets</li> </ol> |
| <b>Indicative Contents</b><br><br>المحتويات الإرشادية                | <p>Here are some indicative contents that may be covered in a course on Analysis and interpretation of spatial images :</p> <ol style="list-style-type: none"> <li>1. Image interpretations</li> <li>2. image segmentation</li> <li>3. Image Classification analysis</li> <li>4. Supervised Classification</li> <li>5. The Classification Stage</li> <li>6. The Training Stage</li> <li>7. Unsupervised Classification</li> <li>8. Pseudo color composites</li> <li>9. Principal Component Analysis</li> <li>10. Change detection</li> <li>11. Anomaly detection</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

#### Strategies

Here are some learning and teaching strategies that may be effective for a course on Analysis and interpretation of spatial images :

1. Lectures: Lectures can provide an overview of key concepts and techniques in Analysis and interpretation of spatial images.
2. Education: provide lectures and printed sources from the modern, diverse and rich sources including examples
3. Education: Harnessing smart blackboard to the goal of teaching students and explain the steps the solution and extraction results
4. Education: resolving some questions, with intent to contain mistakes and make the students extracted error
5. Learning: asking questions and inquiries and making the student turn into a teaching explanation and solution on the blackboard at that point, brainstorming method
6. Learning: questions directly and consequently all students to learn the extent of interaction and the rest to be paid attention to
7. Learning: Each specific group and explain its interaction between students with questions and answers and provide an environment that enables the student to lecture management or debate.
8. Instructors can use slides, diagrams, and other visual aids to help students understand complex topics.
9. Online resources: Online resources such as interactive tutorials, video lectures, and online forums can supplement classroom instruction and provide students with additional opportunities to learn image processing.
10. Assessments: Assessments can help students measure their understanding of course material and provide instructors with feedback on the effectiveness of their teaching. Assessments can include quizzes, exams, and projects. By using a combination of these learning and teaching strategies, instructors can create a dynamic and engaging learning environment that helps students develop the knowledge and skills they need to succeed in the field of Analysis and interpretation of spatial images.

## Student Workload (SWL)

### الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                  |     |                                                                             |  |
|----------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الدراسي المنتظم للطالب خلال الفصل               |     | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا         |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي الغير المنتظم للطالب خلال الفصل |     | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي الغير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي للطالب خلال الفصل                      | 200 |                                                                             |  |

## Module Evaluation

### تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|                | Material Covered                                                                                                                                                                                                  |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Introduction to analysis and interpretation of spatial images. Basis concepts, preliminary notions, practical applications.                                                                                       |
| <b>Week 2</b>  | Principles of image interpretation. Applications of Image Analysis<br>Limitations and future of Image Analysis Technique.                                                                                         |
| <b>Week 3</b>  | Color spaces: properties; perceptual color spaces; linear and non-linear transformations of the RGB color space.                                                                                                  |
| <b>Week 4</b>  | Color image preprocessing: color image enhancement; color image denoising; processing in the RGB color space; processing in other color spaces                                                                    |
| <b>Week 5</b>  | Image Classification. Supervised Classification. The Classification Stage. The Training Stage.                                                                                                                    |
| <b>Week 6</b>  | Color image segmentation – basic algorithms. Unsupervised data clustering algorithms and their application for image segmentation in the feature space: k-means, fuzzy c-means. Hybrid Classification Satellites; |
| <b>Week 7</b>  | Landsat, MODIS & other Multi-spectral Sensors; Intro to Image Classification                                                                                                                                      |
| <b>Week 8</b>  | Classification of Mixed Pixels. The Output Stage and Post classification Smoothing.                                                                                                                               |
| <b>Week 9</b>  | Object-Based Classification. Neural Network Classification. Classification Accuracy Assessment .                                                                                                                  |
| <b>Week 10</b> | Algorithm used to obtain Thresholding                                                                                                                                                                             |
| <b>Week 11</b> | Change Detection.                                                                                                                                                                                                 |

|                |                                                                   |
|----------------|-------------------------------------------------------------------|
| <b>Week 12</b> | Image Time Series Analysis . Hyperspectral Image Analysis         |
| <b>Week 13</b> | Mathematical Morphology                                           |
| <b>Week 14</b> | Image Compression                                                 |
| <b>Week 15</b> | Course review, final project presentations, and exam preparation. |
| <b>Week 16</b> | Preparatory week before the final Exam                            |

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبرات

|                | Material Covered                                                                            |
|----------------|---------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Introduction of Image Analysis and Applications                                             |
| <b>Week 2</b>  | Image Segmentation for spital images                                                        |
| <b>Week 3</b>  | Edge detection for spital images                                                            |
| <b>Week 4</b>  | Edge detection using filtering for spital images                                            |
| <b>Week 5</b>  | Satellites; Landsat, MODIS & other Multi-spectral Sensors; Intro to Image Classification.   |
| <b>Week 6</b>  | Image classification for spital images                                                      |
| <b>Week 7</b>  | Feature extraction and classification in spital image analysis, supervised Classification   |
| <b>Week 8</b>  | Feature extraction and classification in spital image analysis, unsupervised Classification |
| <b>Week 9</b>  | Algorithm used to obtain Thresholding for spital images                                     |
| <b>Week 10</b> | Change Detection for spital images                                                          |
| <b>Week 11</b> | Color image preprocessing for spital images                                                 |
| <b>Week 12</b> | Color image segmentation for spital images                                                  |
| <b>Week 13</b> | Mathematical Morphology                                                                     |
| <b>Week 14</b> | Image Compression                                                                           |
| <b>Week 15</b> | Course review, final project presentations, and exam preparation.                           |

|                                                                 |                                               |                            |
|-----------------------------------------------------------------|-----------------------------------------------|----------------------------|
| <b>Week 16</b>                                                  | <b>Preparatory week before the final Exam</b> |                            |
| <b>Learning and Teaching Resources</b> مصادر<br>التعلم والتدريس |                                               |                            |
|                                                                 | <b>Text</b>                                   | <b>Ava<br/>ilab<br/>le</b> |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>in the<br/>Library?</b> |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <b>Required Texts</b>    | <p>Here are some required texts for a course on analysis and interpretation of spatial images :</p> <ol style="list-style-type: none"> <li>1. Digital Image Processing, Second Edition by Rafael C. Gonzalez and Richard E. Woods, Pearson Education</li> <li>2. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI 2.</li> <li>3. Fundamentals of Digital Image Processing by Anil K Jain, PHI</li> <li>4. Digital Image Processing Using Matlab, Rafael C. Gonzalez and Richard E. Woods, Pearson Education.</li> <li>5. Lillesand, T.M., Kiefer, R.W. and Chapman, J.W., "Remote Sensing and Image Interpretation", (5th Ed.), John Wiley &amp; Sons, 2007.</li> <li>6. Drury, S. A., "Image Interpretation in Geology", 2nd Ed, Allen &amp; Unwin, 1993.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | No                         |
| <b>Recommended Texts</b> | <p>Here are some recommended texts for a course on analysis and interpretation of spatial images :</p> <ol style="list-style-type: none"> <li>1. Al Bovik (ed.), "Handbook of Image and Video Processing", Academic Press, 2000.</li> <li>2. A.K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall, Addison-Wesley, 1989.</li> <li>3. M. Petrou, P. Bosdogianni, "Image Processing, The Fundamentals", Wiley, 1999.</li> <li>4. P. Ramesh Babu, Digital Image Processing. Scitech Publications., 2003.</li> <li>5. Bernd Jähne, Digital Image Processing, Springer-Verlag Berlin Heidelberg 2005.</li> <li>6. B. Jähne, "Practical Handbook on Image Processing for Scientific Applications", CRC Press, 1997.</li> <li>7. J. C. Russ. The Image Processing Handbook. CRC, Boca Raton, FL, 4th edn., 2002.</li> <li>8. J. S. Lim, "Two-dimensional Signal and Image Processing" Prentice-Hall, 1990.</li> <li>9. Rudra Pratap, Getting Started With MATLAB 7. Oxford University Press, 2006</li> <li>10. W. K. Pratt. Digital image processing, PIKS Inside. Wiley, New York, 3rd, edn., 2001.</li> <li>11. Stephane Marchand-Maillet, Yazid M. Sharaiha, Binary Digital Image Processing, A Discrete Approach, Academic Press, 2000.</li> </ol> | No                         |
| <b>Websites</b>          | <ol style="list-style-type: none"> <li>1. (<a href="https://www.esri.com/training/catalog/5c9a65e0190cf23eac628f9c/performing-supervised-object-based-imageclassification/">https://www.esri.com/training/catalog/5c9a65e0190cf23eac628f9c/performing-supervised-object-based-imageclassification/</a>)</li> <li>2. (<a href="https://www.esri.com/training/catalog/5c75869c65e21d6e2187b712/performingsupervised-pixel-based-imageclassification/">https://www.esri.com/training/catalog/5c75869c65e21d6e2187b712/performingsupervised-pixel-based-imageclassification/</a>)</li> <li>3. (<a href="https://www.esri.com/training/catalog/5cf6d9a5e8c1820501654ee3/detecting-objects-with-deep-learning/">https://www.esri.com/training/catalog/5cf6d9a5e8c1820501654ee3/detecting-objects-with-deep-learning/</a>)</li> <li>4. (<a href="https://www.esri.com/training/catalog/5c9a727b190cf23eac62a78f/performing-accuracyassessment-for-imageclassification/">https://www.esri.com/training/catalog/5c9a727b190cf23eac62a78f/performing-accuracyassessment-for-imageclassification/</a>)</li> </ol>                                                                                                                                                          |                            |

## Grading Scheme

### مخطط الدرجات

| Group                           | Grade                   | التقدير             | Marks %  | Definition                            |
|---------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group (50 - 100)</b> | <b>A</b> - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                 | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                 | <b>C</b> - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                 | <b>D</b> - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                 | <b>E</b> - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group (0 – 49)</b>      | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                 | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                 |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

## Module Information

### معلومات المادة الدراسية

|                                    |                      |                |                               |                                                                                                                                                                                                                                                                                                        |       |
|------------------------------------|----------------------|----------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Module Title                       | GIS in Public Health |                |                               | Module Delivery                                                                                                                                                                                                                                                                                        |       |
| Module Type                        | Elective             |                |                               | <div><input checked="" type="checkbox"/> Theory</div> <div><input checked="" type="checkbox"/> Lecture</div> <div><input checked="" type="checkbox"/> Lab</div> <div><input type="checkbox"/> Tutorial</div> <div><input type="checkbox"/> Practical</div> <div><input type="checkbox"/> Seminar</div> |       |
| Module Code                        | UOBR553              |                |                               |                                                                                                                                                                                                                                                                                                        |       |
| ECTS Credits                       | 100                  |                |                               |                                                                                                                                                                                                                                                                                                        |       |
| SWL (hr/sem)                       | 4                    |                |                               |                                                                                                                                                                                                                                                                                                        |       |
| Module Level                       |                      | 3              | Semester of Delivery          |                                                                                                                                                                                                                                                                                                        |       |
| Administering Department           |                      | Remote Sensing | College                       | Science                                                                                                                                                                                                                                                                                                |       |
| Module Leader                      | فالح حسن محمود       |                | e-mail                        |                                                                                                                                                                                                                                                                                                        |       |
| Module Leader's Acad. Title        |                      | Professor      | Module Leader's Qualification |                                                                                                                                                                                                                                                                                                        | Ph.D. |
| Module Tutor                       | Name (if available)  |                | e-mail                        | E-mail                                                                                                                                                                                                                                                                                                 |       |
| Peer Reviewer Name                 |                      | لوي كاظم       | e-mail                        | E-mail                                                                                                                                                                                                                                                                                                 |       |
| Scientific Committee Approval Date |                      | 1/10/2025      | Version Number                |                                                                                                                                                                                                                                                                                                        | 1.0   |

## Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                      |      |          |  |
|----------------------|------|----------|--|
| Prerequisite module  | None | Semester |  |
| Co-requisites module | None | Semester |  |

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <p>By the end of this module, students will be able to:</p> <p>This course introduces students to the principles and applications of Geographic Information Systems (GIS) in public health. It focuses on spatial analysis, disease mapping, epidemiology, environmental health assessment, healthcare accessibility, and decision-support systems. Students will learn how GIS technologies support disease surveillance, health planning, emergency response, and sustainable health development through practical applications and case studies.</p> <ol style="list-style-type: none"> <li>1. Understand the fundamental concepts of Geographic Information Systems (GIS) and their applications in public health</li> <li>2. Explain the role of spatial analysis in disease surveillance, health planning, and epidemiological studies</li> <li>3. Collect, manage, and analyze spatial health data using GIS software and geospatial technologies</li> <li>4. Apply GIS techniques to identify disease patterns, environmental health risks, and healthcare accessibility</li> <li>5. Produce thematic maps and spatial models to support public health decision-making</li> <li>6. Evaluate the relationships between environmental, social, and demographic factors and health outcomes</li> <li>7. Use GIS tools for outbreak investigation, emergency response, and health resource allocation</li> <li>8. Integrate remote sensing and spatial databases into public health research and community health assessment</li> <li>9. Interpret spatial statistics and geographic patterns related to public health indicators</li> </ol> <p>Develop practical GIS-based solutions for improving public health services and sustainable community health management</p> |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <p>Upon successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>• Define GIS concepts and spatial data structures.</li> <li>• Perform spatial data collection and georeferencing.</li> <li>• Conduct disease mapping and hotspot analysis.</li> <li>• Analyze healthcare accessibility and service distribution.</li> <li>• Use GIS software for epidemiological investigations.</li> <li>• Interpret spatial relationships between environment and health.</li> <li>• Design maps and reports for public health communication.</li> <li>• Apply GIS in disaster management and outbreak response.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | <p><b>Unit 1: Introduction to GIS and Public Health</b></p> <ul style="list-style-type: none"> <li>• Definition and concepts of GIS</li> <li>• Components of GIS</li> <li>• Importance of GIS in public health</li> <li>• Historical development of health GIS</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

- Applications of GIS in healthcare systems

## **Unit 2: Spatial Data and Health Information**

- Types of spatial data
- Raster and vector data models
- Sources of health spatial data
- GPS and field data collection
- Spatial databases in health studies

## **Unit 3: Coordinate Systems and Mapping**

- Coordinate systems and map projections
- Georeferencing techniques
- Map scales and accuracy
- Cartographic principles in public health mapping

## **Unit 4: GIS Software Applications**

- Introduction to GIS software environments
- Data input and editing
- Database creation and management
- Spatial query and visualization techniques

## **Unit 5: Disease Mapping and Epidemiology**

- Principles of disease mapping
- Spatial distribution of diseases
- Epidemiological mapping techniques
- Cluster and hotspot analysis
- Communicable and non-communicable disease mapping

## **Unit 6: Spatial Analysis in Public Health**

- Buffer analysis
- Overlay analysis
- Network and accessibility analysis
- Spatial interpolation methods
- Spatial statistics and health indicators

## **Unit 7: Environmental Health Applications**

- Environmental risk assessment
- Air, water, and soil pollution m
- Climate and health relationships
- Urban health and environmental exposure studies

## **Unit 8: Healthcare Planning and Management**

- Healthcare facility location analysis
- Accessibility to health services
- Resource allocation and planning
- GIS-based decision support systems

## **Unit 9: Remote Sensing and Public Health**

- Introduction to remote sensing
- Satellite imagery in health studies
- Land use and disease relationships
- Environmental monitoring using remote sensing

## **Unit 10: GIS in Disaster and Emergency Management**

- Disaster risk mapping
- Epidemic outbreak management
- Emergency response planning
- Spatial modeling for crisis management

## **Unit 11: Public Health Research and Case Studies**

- GIS-based health research methodologies
- Case studies in epidemiology
- Spatial modeling projects
- Ethical considerations in health GIS

## **Unit 12: Future Trends in Health GIS**

- Geospatial Artificial Intelligence (GeoAI)
- Big Data and health analytics

|                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                               | <ul style="list-style-type: none"> <li>Smart health systems</li> <li>Sustainable development and health GIS</li> <li>Future directions of spatial health technologies</li> </ul>                                                                                                                                                                                                                                                                                                  |
| <b>Learning and Teaching Strategies</b><br><b>استراتيجيات التعلم والتعليم</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Strategies</b>                                                             | <input type="checkbox"/> Disease Surveillance<br><input type="checkbox"/> Epidemic and Pandemic Monitoring<br><input type="checkbox"/> Environmental Health Assessment<br><input type="checkbox"/> Healthcare Accessibility Studies<br><input type="checkbox"/> Vaccination Campaign Planning<br><input type="checkbox"/> Emergency and Disaster Response<br><input type="checkbox"/> Sustainable Health Development<br><input type="checkbox"/> Spatial Decision Support Systems |

|                                                                                 |            |                                                                           |  |
|---------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Student Workload (SWL)</b><br><b>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا</b> |            |                                                                           |  |
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل        |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل  |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل               | <b>200</b> |                                                                           |  |

|                                                          |                        |                    |                       |                 |                                  |
|----------------------------------------------------------|------------------------|--------------------|-----------------------|-----------------|----------------------------------|
| <b>Module Evaluation</b><br><b>تقييم المادة الدراسية</b> |                        |                    |                       |                 |                                  |
|                                                          |                        | <b>Time/Number</b> | <b>Weight (Marks)</b> | <b>Week Due</b> | <b>Relevant Learning Outcome</b> |
| <b>Formative assessment</b>                              | <b>Quizzes</b>         | 2                  | 10% (10)              | 5 and 10        | LO #1, #2 and #10, #11           |
|                                                          | <b>Assignments</b>     | 2                  | 10% (10)              | 2 and 12        | LO #3, #4 and #6, #7             |
|                                                          | <b>Projects / Lab.</b> | 1                  | 10% (10)              | Continuous      | All                              |
|                                                          | <b>Report</b>          | 1                  | 10% (10)              | 13              | LO #5, #8 and #10                |
| <b>Summative assessment</b>                              | <b>Midterm Exam</b>    | 2hr                | 10% (10)              | 7               | LO #1 - #7                       |
|                                                          | <b>Final Exam</b>      | 3hr                | 50% (50)              | 16              | All                              |
| <b>Total assessment</b>                                  |                        |                    | 100% (100 Marks)      |                 |                                  |

|                                                                          |                                       |
|--------------------------------------------------------------------------|---------------------------------------|
| <b>Delivery Plan (Weekly Syllabus)</b><br><b>المنهاج الاسبوعي النظري</b> |                                       |
|                                                                          | <b>Material Covered</b>               |
| <b>Week 1</b>                                                            | Introduction to GIS and Public Health |

|                |                                               |
|----------------|-----------------------------------------------|
| <b>Week 2</b>  | Spatial Data Types and Sources                |
| <b>Week 3</b>  | 3 Coordinate Systems and Map Projections      |
| <b>Week 4</b>  | Disease Mapping and Health Visualization      |
| <b>Week 5</b>  | 7 Epidemiology and Spatial Analysis           |
| <b>Week 6</b>  | Mid-Term Examination                          |
| <b>Week 7</b>  | Environmental Health and Risk Mapping         |
| <b>Week 8</b>  | Healthcare Accessibility Analysis             |
| <b>Week 9</b>  | Spatial Statistics in Public Health           |
| <b>Week 10</b> | Remote Sensing Applications in Health Studies |
| <b>Week 11</b> | Spatial Statistics in Public Health           |
| <b>Week 12</b> | GIS in Disaster and Emergency Management      |
| <b>Week 13</b> | Public Health Decision Support Systems        |
| <b>Week 14</b> | Student Presentations and Final Project       |
| <b>Week 15</b> | Siminars                                      |
| <b>Week 16</b> |                                               |

| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي العملي |                  |
|------------------------------------------------------------------------|------------------|
|                                                                        | Material Covered |
| <b>Week 1</b>                                                          |                  |
| <b>Week 2</b>                                                          |                  |
| <b>Week 3</b>                                                          |                  |
| <b>Week 4</b>                                                          |                  |
| <b>Week 5</b>                                                          |                  |
| <b>Week 6</b>                                                          |                  |
| <b>Week 7</b>                                                          |                  |
| <b>Week 8</b>                                                          |                  |
| <b>Week 9</b>                                                          |                  |
| <b>Week 10</b>                                                         |                  |
| <b>Week 11</b>                                                         |                  |
| <b>Week 12</b>                                                         |                  |
| <b>Week 13</b>                                                         |                  |
| <b>Week 14</b>                                                         |                  |
| <b>Week 15</b>                                                         |                  |
| <b>Week 16</b>                                                         |                  |

| Learning and Teaching Resources |
|---------------------------------|
|---------------------------------|

### مصادر التعلم والتدريس

|                   | Text                                                                                                                                                                                                                                                                                | Available in the Library? |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Required Texts    | Cromley, E. K., & McLafferty, S. L. <i>GIS and Public Health</i> .                                                                                                                                                                                                                  | No                        |
| Recommended Texts | <input type="checkbox"/> Gatrell, A., & Loytonen, M. <i>GIS and Health</i> .<br><input type="checkbox"/> Longley, P. et al. <i>Geographic Information Systems and Science</i> .<br><input type="checkbox"/> Burrough, P. A., & McDonnell, R. <i>Principles of Geographical Info</i> |                           |
| Websites          | 1. ESRI Training Manuals and Public Health GIS Resources.                                                                                                                                                                                                                           |                           |

### Grading Scheme

#### مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(50 - 100) | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                             | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                             | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                             | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                             | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)      | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                             | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                             |                  |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

### Module Information

#### معلومات المادة الدراسية

| Module Title | Data Structure and Management in GIS | Module Delivery                                                                           |
|--------------|--------------------------------------|-------------------------------------------------------------------------------------------|
| Module Type  | core                                 | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture |
| Module Code  | RSGIS35023                           |                                                                                           |
| ECTS Credits | 6                                    |                                                                                           |

|                                    |                     |                                   |                                                                                                                                                                                         |                    |      |
|------------------------------------|---------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------|
| SWL (hr/sem)                       | 150                 |                                   | <input checked="" type="checkbox"/> Lab<br><input checked="" type="checkbox"/> Tutorial<br><input checked="" type="checkbox"/> Practical<br><input checked="" type="checkbox"/> Seminar |                    |      |
| Module Level                       |                     | 3                                 | Semester of Delivery                                                                                                                                                                    |                    | 5    |
| Administering Department           |                     | Remote sensing and GIS department | College                                                                                                                                                                                 | college of science |      |
| Module Leader                      | زينب طالب درويش     |                                   | e-mail                                                                                                                                                                                  |                    |      |
| Module Leader's Acad. Title        |                     | Lecturer                          | Module Leader's Qualification                                                                                                                                                           |                    | PhD. |
| Module Tutor                       | Name (if available) |                                   | e-mail                                                                                                                                                                                  | E-mail             |      |
| Peer Reviewer Name                 |                     | علاء حسن هارف                     | e-mail                                                                                                                                                                                  | E-mail             |      |
| Scientific Committee Approval Date |                     | 01/10/2025                        | Version Number                                                                                                                                                                          |                    | 1.0  |

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                      |      |          |  |
|----------------------|------|----------|--|
| Prerequisite module  | None | Semester |  |
| Co-requisites module | None | Semester |  |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <ul style="list-style-type: none"> <li>To enhance students' knowledge in GIS data structures and management.</li> <li>To provide fundamental concepts of remote sensing and GIS databases.</li> <li>To develop students' skills in handling GIS software and spatial data.</li> <li>To build analytical and problem-solving abilities in geospatial data processing.</li> </ul>                        |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | A. Knowledge and Understanding <ul style="list-style-type: none"> <li>Apply critical thinking and problem-solving in GIS and remote sensing.</li> <li>Analyze scientific problems using mathematical and scientific principles.</li> <li>Communicate effectively in both Arabic and English in a scientific context.</li> <li>Understand international standards in remote sensing and GIS.</li> </ul> |

|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                           | <p><b>B. Subject-Specific Skills</b></p> <ul style="list-style-type: none"> <li>• Apply techniques for analyzing remote sensing data.</li> <li>• Solve scientific problems and propose alternative solutions.</li> <li>• Conduct scientific investigation and evaluation.</li> <li>• Participate in constructive scientific discussions.</li> </ul> <p><b>C. Thinking Skills</b></p> <ul style="list-style-type: none"> <li>• Analyze, interpret, and organize knowledge effectively.</li> <li>• Apply deep and surface learning strategies to solve problems.</li> <li>• Develop hypothesis formulation and scientific reasoning.</li> </ul> <p><b>D. General and Transferable Skills</b></p> <ul style="list-style-type: none"> <li>• Communication and IT skills in teamwork environments.</li> <li>• Ability to work collaboratively.</li> <li>• Proficiency in Arabic and English communication.</li> <li>• Leadership, quick thinking, and analytical prediction skills.</li> </ul> |
| <p><b>Indicative Contents</b><br/>المحتويات الإرشادية</p> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Basics of computer files</li> <li><input type="checkbox"/> Geospatial data structures (vector &amp; raster)</li> <li><input type="checkbox"/> Database design and lifecycle</li> <li><input type="checkbox"/> GIS databases</li> <li><input type="checkbox"/> Relational database benefits</li> <li><input type="checkbox"/> Vector data structures and topology</li> <li><input type="checkbox"/> Spatial data quality</li> <li><input type="checkbox"/> Raster data structures (encoding methods)</li> <li><input type="checkbox"/> Graphic data structures in GIS</li> <li><input type="checkbox"/> Database systems and DBMS</li> <li><input type="checkbox"/> Database architecture</li> <li><input type="checkbox"/> Data models</li> </ul>                                                                                                                                                                         |

| <p><b>Learning and Teaching Strategies</b><br/>استراتيجيات التعلم والتعليم</p> |                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Strategies</b></p>                                                       | <ul style="list-style-type: none"> <li>• Theoretical and practical lectures</li> <li>• Discussions and interactive dialogue</li> <li>• Field visits</li> <li>• Seminars and student presentations</li> </ul> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                              |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>Research assignments</li> <li>Library and self-learning activities</li> </ul> <p><b>Outcomes achieved through:</b></p> <ul style="list-style-type: none"> <li>Differentiating correct vs. incorrect information</li> <li>Scientific writing and reasoning</li> <li>Linking concepts and technical instructions</li> <li>Interpretation and analysis skills</li> </ul> |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Student Workload (SWL)                                                         |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا                                        |            |                                                                           |  |
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>200</b> |                                                                           |  |

| Module Evaluation           |                        |             |                  |            |                           |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| تقييم المادة الدراسية       |                        |             |                  |            |                           |
|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

| Delivery Plan (Weekly Syllabus) |
|---------------------------------|
|---------------------------------|

المنهاج الاسبوعي النظري

|         | Material Covered                                  |
|---------|---------------------------------------------------|
| Week 1  | Basics of Computer File                           |
| Week 2  | Reviewing the basics of geospatial data           |
| Week 3  | Database design standards and DB life cycle       |
| Week 4  | The GIS Database                                  |
| Week 5  | Benefits of Relational Database Approach          |
| Week 6  | Modern Spatial Data Models and Quality Assessment |
| Week 7  | Vector / Spatial data Quality                     |
| Week 8  | Raster data structure                             |
| Week 9  | Graphic data structures in GIS                    |
| Week 10 | Exam                                              |
| Week 11 | Introduction to Database Systems                  |
| Week 12 | Database Management System                        |
| Week 13 | Objectives of DBMS                                |
| Week 14 | Database Architecture                             |
| Week 15 | Data Models                                       |
| Week 16 | Exam                                              |

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

|        | Material Covered                                       |
|--------|--------------------------------------------------------|
| Week 1 | Topic                                                  |
| Week 2 | Introduction to Microsoft Access and Database Concepts |
| Week 3 | Creating Databases and Understanding Tables            |
| Week 4 | Data Types and Field Properties                        |
| Week 5 | Table Design and Primary Keys                          |
| Week 6 | Data Entry, Editing, and Validation                    |
| Week 7 | Introduction to Relationships between Tables           |
| Week 8 | Advanced Table Relationships and Referential Integrity |

|                |                                                              |
|----------------|--------------------------------------------------------------|
| <b>Week 9</b>  | Queries: Basics and Simple Queries                           |
| <b>Week 10</b> | Advanced Queries (Criteria, Calculations, Parameter Queries) |
| <b>Week 11</b> | Forms: Creating and Designing Forms                          |
| <b>Week 12</b> | Advanced Forms and Controls                                  |
| <b>Week 13</b> | Reports: Creating and Formatting Reports                     |
| <b>Week 14</b> | Advanced Reports and Data Presentation                       |
| <b>Week 15</b> | Macros in Microsoft Access                                   |
| <b>Week 16</b> | Database Management, Security, and Optimization              |

| <b>Learning and Teaching Resources</b><br>مصادر التعلم والتدريس |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                  |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Available in the Library?</b> |
| <b>Required Texts</b>                                           | <p>Required Textbook</p> <ul style="list-style-type: none"> <li><i>Fundamentals of Relational Database Management Systems</i> – S. Sumathi &amp; S. Esakkirajan (2007)</li> </ul> <p>Main References</p> <ul style="list-style-type: none"> <li>Elmasri &amp; Navathe – <i>Fundamentals of Database Systems</i></li> <li>C.J. Date – <i>Introduction to Database Systems</i></li> <li>Ramakrishnan &amp; Gehrke – <i>Database Management Systems</i></li> </ul> | NO                               |
| <b>Recommended Texts</b>                                        | <p>Recommended Resources</p> <ul style="list-style-type: none"> <li>Scopus-indexed journals and scientific publications</li> <li>Online GIS and database platforms</li> <li>Official software documentation</li> </ul>                                                                                                                                                                                                                                          | NO                               |
| <b>Websites</b>                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                  |

| <b>Grading Scheme</b><br>مخطط الدرجات |       |         |         |            |
|---------------------------------------|-------|---------|---------|------------|
| Group                                 | Grade | التقدير | Marks % | Definition |

|                                    |                         |                     |          |                                       |
|------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group</b><br>(50 - 100) | <b>A - Excellent</b>    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                    | <b>B - Very Good</b>    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                    | <b>C - Good</b>         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                    | <b>D - Satisfactory</b> | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                    | <b>E - Sufficient</b>   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group</b><br>(0 - 49)      | <b>FX – Fail</b>        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                    | <b>F – Fail</b>         | راسب                | (0-44)   | Considerable amount of work required  |
|                                    |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

## المرحلة الثالثة (الفصل الثاني)

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

| <b>Module Information</b><br>معلومات المادة الدراسية |                           |                                   |                                                                                                                                                                                                                   |                    |
|------------------------------------------------------|---------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Module Title</b>                                  | <b>Information System</b> |                                   | <b>Module Delivery</b>                                                                                                                                                                                            |                    |
| <b>Module Type</b>                                   | <b>C</b>                  |                                   | <input checked="" type="checkbox"/> Theory<br><br><input checked="" type="checkbox"/> Lecture<br><br><b>Lab</b><br><br><b>Tutorial</b><br><br><b>Practical</b><br><br><input checked="" type="checkbox"/> Seminar |                    |
| <b>Module Code</b>                                   | <b>RSGIS35023</b>         |                                   |                                                                                                                                                                                                                   |                    |
| <b>ECTS Credits</b>                                  | <b>4</b>                  |                                   |                                                                                                                                                                                                                   |                    |
| <b>SWL (hr/sem)</b>                                  | <b>100</b>                |                                   |                                                                                                                                                                                                                   |                    |
| <b>Module Level</b>                                  |                           | 3                                 | <b>Semester of Delivery</b>                                                                                                                                                                                       | 6                  |
| <b>Administering Department</b>                      |                           | Remote sensing and GIS department | <b>College</b>                                                                                                                                                                                                    | college of science |

|                                           |                     |                                      |                                        |
|-------------------------------------------|---------------------|--------------------------------------|----------------------------------------|
| <b>Module Leader</b>                      | Zainab T. Al-Ars    | <b>e-mail</b>                        | E-mail<br>Zainab.t@sc.uobaghdad.edu.iq |
| <b>Module Leader's Acad. Title</b>        | Lecturer            | <b>Module Leader's Qualification</b> | PhD.                                   |
| <b>Module Tutor</b>                       | Name (if available) | <b>e-mail</b>                        | E-mail                                 |
| <b>Peer Reviewer Name</b>                 | Name                | <b>e-mail</b>                        | E-mail                                 |
| <b>Scientific Committee Approval Date</b> | 10/03/2026          | <b>Version Number</b>                | 1.0                                    |

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                             |      |                 |  |
|-----------------------------|------|-----------------|--|
| <b>Prerequisite module</b>  | None | <b>Semester</b> |  |
| <b>Co-requisites module</b> | None | <b>Semester</b> |  |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <ul style="list-style-type: none"> <li>To introduce students to the fundamental concepts of Information Systems in GIS and Remote Sensing.</li> <li>To develop students' understanding of system structures, components, and workflows.</li> <li>To explain the role of Information Systems in spatial analysis and decision-making.</li> <li>To enhance analytical thinking and problem-solving skills in geospatial environments.</li> <li>To provide knowledge about system integration, databases, and decision support systems in GIS applications.</li> </ul>                                                                   |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <p><b>A. Knowledge and Understanding</b></p> <ul style="list-style-type: none"> <li>Understand the concepts and classifications of Information Systems.</li> <li>Explain the relationship between GIS and Information Systems.</li> <li>Analyze data flow and information processing in spatial systems.</li> <li>Understand database and decision-support concepts in GIS applications.</li> </ul> <p><b>B. Subject-Specific Skills</b></p> <ul style="list-style-type: none"> <li>Apply GIS information system concepts in practical applications.</li> <li>Analyze system structures and workflows in GIS environments.</li> </ul> |

|                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                              | <ul style="list-style-type: none"> <li>• Evaluate spatial data management processes.</li> <li>• Use analytical reasoning in system design and spatial problem-solving.</li> </ul> <p><b>C. Thinking Skills</b></p> <ul style="list-style-type: none"> <li>• Develop logical and analytical thinking abilities.</li> <li>• Interpret spatial workflows and system architectures.</li> <li>• Compare different Information System models and applications.</li> </ul> <p><b>D. General and Transferable Skills</b></p> <ul style="list-style-type: none"> <li>• Communication and teamwork skills.</li> <li>• Scientific discussion and presentation skills.</li> <li>• Ability to use IT and GIS technologies effectively.</li> <li>• Self-learning and research skills.</li> </ul> |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p> | <ul style="list-style-type: none"> <li>• Introduction to Information Systems</li> <li>• System Concepts and Characteristics</li> <li>• Input, Process, Output, and Feedback</li> <li>• Data, Information, and Knowledge</li> <li>• Components of Information Systems</li> <li>• Evolution of Information Systems</li> <li>• Types of Information Systems</li> <li>• Transaction Processing Systems (TPS)</li> <li>• Management Information Systems (MIS)</li> <li>• Decision Support Systems (DSS)</li> <li>• Executive Support Systems (ESS)</li> <li>• Data Flow and Information Processing in GIS</li> <li>• System Integration in GIS Applications</li> <li>• Information Systems Failures and Decision-Making</li> </ul>                                                      |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                          |                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Strategies</b></p> | <ul style="list-style-type: none"> <li>• Theoretical lectures using PowerPoint presentations.</li> <li>• Interactive classroom discussions.</li> <li>• GIS and Information Systems demonstrations.</li> <li>• Student presentations and seminars.</li> <li>• Research assignments and reports.</li> <li>• E-learning and self-learning activities using online platforms.</li> </ul> |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 64         | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 32         | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>100</b> |                                                                           |  |

### Module Evaluation

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|               | Material Covered                           |
|---------------|--------------------------------------------|
| <b>Week 1</b> | Introduction to Information Systems        |
| <b>Week 2</b> | System Concepts and Characteristics        |
| <b>Week 3</b> | Input, Process, Output, and Feedback Model |
| <b>Week 4</b> | Data, Information, and Knowledge           |
| <b>Week 5</b> | Components of Information Systems          |

|                |                                                                           |
|----------------|---------------------------------------------------------------------------|
| <b>Week 6</b>  | Evolution and Importance of Information Systems in GIS and Remote Sensing |
| <b>Week 7</b>  | Types of Information Systems                                              |
| <b>Week 8</b>  | Transaction Processing Systems (TPS)                                      |
| <b>Week 9</b>  | Management Information Systems (MIS)                                      |
| <b>Week 10</b> | Midterm Exam                                                              |
| <b>Week 11</b> | Decision Support Systems (DSS)                                            |
| <b>Week 12</b> | Executive Support Systems (ESS)                                           |
| <b>Week 13</b> | Information Processing and Data Flow in GIS                               |
| <b>Week 14</b> | System Integration and GIS Applications                                   |
| <b>Week 15</b> | Information Systems Failures and Decision-Making                          |
| <b>Week 16</b> | Final Exam                                                                |

| Learning and Teaching Resources |                                                                                                                                                                                                                                                                                                                                                         |                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| مصادر التعلم والتدريس           |                                                                                                                                                                                                                                                                                                                                                         |                           |
|                                 |                                                                                                                                                                                                                                                                                                                                                         | Available in the Library? |
| <b>Required Texts</b>           | <p><b>Required Texts</b></p> <ul style="list-style-type: none"> <li>Fundamentals of Information Systems</li> <li>Introduction to Information Systems in GIS</li> </ul> <p><b>Main References</b></p> <ul style="list-style-type: none"> <li>Lecture notes prepared by the instructor.</li> <li>GIS and Remote Sensing scientific references.</li> </ul> | NO                        |
| <b>Recommended Texts</b>        | <p><b>Recommended References</b></p> <ul style="list-style-type: none"> <li>Scopus-indexed journals in GIS and Information Systems.</li> <li>Scientific reports and online GIS resources.</li> </ul>                                                                                                                                                    | NO                        |
| <b>Websites</b>                 | <p><b>Websites</b></p> <ul style="list-style-type: none"> <li><a href="#">Esri GIS Resources</a></li> <li>QGIS Documentation</li> <li><a href="#">Google Maps Platform</a></li> </ul>                                                                                                                                                                   |                           |

| Grading Scheme                                                                                                                                                                                                                                                                                                                                                                              |                         |                     |          |                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                                                |                         |                     |          |                                       |
| Group                                                                                                                                                                                                                                                                                                                                                                                       | Grade                   | التقدير             | Marks %  | Definition                            |
| <b>Success Group</b><br>(50 - 100)                                                                                                                                                                                                                                                                                                                                                          | <b>A</b> - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                             | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                             | <b>C</b> - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                             | <b>D</b> - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                             | <b>E</b> - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group</b><br>(0 – 49)                                                                                                                                                                                                                                                                                                                                                               | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                             | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                                                                                                                                                                                                                                                                                                                                                                             |                         |                     |          |                                       |
| <p><b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.</p> |                         |                     |          |                                       |

| Module Information          |                                |                   |                                                                                                                                                                                                                                                     |                   |       |
|-----------------------------|--------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------|
| معلومات المادة الدراسية     |                                |                   |                                                                                                                                                                                                                                                     |                   |       |
| Module Title                | Aerial and thermal photography |                   | Module Delivery                                                                                                                                                                                                                                     |                   |       |
| Module Type                 | Core                           |                   | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                   |       |
| Module Code                 | UOBR562                        |                   |                                                                                                                                                                                                                                                     |                   |       |
| ECTS Credits                | 7                              |                   |                                                                                                                                                                                                                                                     |                   |       |
| SWL (hr/sem)                | 175                            |                   |                                                                                                                                                                                                                                                     |                   |       |
| Module Level                |                                | 3                 | Semester of Delivery                                                                                                                                                                                                                                |                   | 6     |
| Administering Department    |                                | Type Dept. Code   | College                                                                                                                                                                                                                                             | Type College Code |       |
| Module Leader               | لؤي كاظم                       |                   | e-mail                                                                                                                                                                                                                                              | E-mail            |       |
| Module Leader's Acad. Title |                                | Asstant Professor | Module Leader's Qualification                                                                                                                                                                                                                       |                   | Ph.D. |
| Module Tutor                | Name (if available)            |                   | e-mail                                                                                                                                                                                                                                              | E-mail            |       |
| Peer Reviewer Name          |                                | احلام علي حسين    | e-mail                                                                                                                                                                                                                                              | E-mail            |       |

|                                           |            |                       |     |
|-------------------------------------------|------------|-----------------------|-----|
| <b>Scientific Committee Approval Date</b> | 10/03/2026 | <b>Version Number</b> | 1.0 |
|-------------------------------------------|------------|-----------------------|-----|

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                             |      |                 |  |
|-----------------------------|------|-----------------|--|
| <b>Prerequisite module</b>  | None | <b>Semester</b> |  |
| <b>Co-requisites module</b> | None | <b>Semester</b> |  |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>                | <ol style="list-style-type: none"> <li>1. Understanding the basics of aerial and thermal photography: Students should learn about the principles of aerial photography, such as the different types of cameras used, the principles of photogrammetry, and the importance of accurate georeferencing. They should also learn about thermal imaging and its various applications.</li> <li>2. Understanding the equipment and technology used in aerial and thermal photography: Students should become familiar with the different types of cameras and sensors used in aerial and thermal photography, as well as the different types of platforms used to capture images, such as drones, airplanes, and satellites.</li> <li>3. Developing skills in image interpretation and analysis: Students should learn how to interpret and analyze images captured through aerial and thermal photography. They should be able to identify key features in the images, such as buildings, roads, and bodies of water, and understand how these features can be used to gain insights into various fields such as agriculture, environmental studies, and urban planning.</li> <li>4. Understanding the applications of aerial and thermal photography: Students should become familiar with the various applications of aerial and thermal photography, such as mapping, surveying, monitoring environmental changes, and identifying and analyzing objects in various fields such as archaeology, geology, and agriculture.</li> <li>5. Developing technical skills in image processing: Students should learn how to process and analyze images using various software tools and techniques, such as photogrammetry software, GIS software, and programming languages.</li> <li>6. Understanding the ethical and legal considerations of aerial and thermal photography: Students should learn about the ethical and legal considerations related to the use of aerial and thermal photography, such as privacy concerns, safety considerations, and regulations related to the use of drones and other aerial platforms.</li> </ol> |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p> | <ol style="list-style-type: none"> <li>1. Explain the principles and concepts of aerial and thermal photography, including the types of cameras used, photogrammetry, and thermal imaging.</li> <li>2. Describe the different types of equipment and technology used in aerial and thermal photography, including drones, airplanes, satellites, and sensors.</li> <li>3. Interpret and analyze images captured through aerial and thermal photography, and identify key features and patterns in the images.</li> <li>4. Apply aerial and thermal photography techniques to various fields, including mapping, surveying, environmental monitoring, and object identification and analysis.</li> <li>5. Process and analyze images using various software tools and techniques, such as photogrammetry software, GIS software, and programming languages.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

|                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                              | <ol style="list-style-type: none"> <li>6. Demonstrate an understanding of the ethical and legal considerations related to aerial and thermal photography, including privacy concerns, safety considerations, and regulations related to the use of drones and other aerial platforms.</li> <li>7. Apply critical thinking and problem-solving skills to real-world scenarios involving aerial and thermal photography techniques and technologies.</li> <li>8. Communicate effectively about aerial and thermal photography concepts and techniques, both orally and in writing.</li> <li>9. Develop a sense of curiosity and interest in the field of aerial and thermal photography, and an understanding of its potential for innovation and impact in various fields.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p> | <ol style="list-style-type: none"> <li>1. Introduction to aerial and thermal photography: <ul style="list-style-type: none"> <li>- Definition and basic principles of aerial and thermal photography</li> <li>- Types of cameras and sensors used in aerial and thermal photography</li> <li>- Applications and benefits of aerial and thermal photography technology</li> </ul> </li> <li>2. Aerial photography platforms and equipment: <ul style="list-style-type: none"> <li>- Drones and their components</li> <li>- Fixed-wing aircraft and their components</li> <li>- Satellites and their components</li> <li>- Cameras, sensors, and other equipment used in aerial photography</li> </ul> </li> <li>3. Photogrammetry and georeferencing: <ul style="list-style-type: none"> <li>- Principles of photogrammetry</li> <li>- Georeferencing techniques and applications</li> <li>- Creating accurate and precise maps using aerial photography</li> </ul> </li> <li>4. Thermal imaging: <ul style="list-style-type: none"> <li>- Basic principles of thermal imaging</li> <li>- Applications of thermal imaging in various fields</li> <li>- Interpreting thermal images and identifying thermal patterns</li> </ul> </li> <li>5. Image interpretation and analysis: <ul style="list-style-type: none"> <li>- Identifying key features in aerial and thermal images</li> <li>- Interpreting images to gain insights into various fields such as agriculture, environmental studies, and urban planning</li> <li>- Using GIS software to analyze and interpret aerial and thermal images</li> </ul> </li> <li>6. Image processing and analysis: <ul style="list-style-type: none"> <li>- Processing and analyzing aerial and thermal images using various software tools and techniques</li> <li>- Creating 3D models from aerial images</li> <li>- Programming languages and tools for image processing and analysis</li> </ul> </li> <li>7. Legal and ethical considerations:</li> </ol> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>- Regulations and guidelines related to the use of drones and other aerial platforms</li> <li>- Privacy concerns related to aerial photography</li> <li>- Safety considerations and guidelines for aerial photography</li> </ul> <p>8. Applications of aerial and thermal photography:</p> <ul style="list-style-type: none"> <li>- Mapping and surveying</li> <li>- Environmental monitoring</li> <li>- Object identification and analysis in various fields such as archaeology, geology, and agriculture</li> <li>- Urban planning and development</li> </ul> <p>9. Future trends and innovations:</p> <ul style="list-style-type: none"> <li>- Emerging technologies in aerial and thermal photography</li> <li>- Potential applications of aerial and thermal photography in the future</li> <li>- Challenges and opportunities in the field of aerial and thermal photography.</li> </ul> |
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## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <ol style="list-style-type: none"> <li>1. Lectures and presentations: Instructors can deliver lectures and presentations to provide an overview of the concepts and principles of aerial and thermal photography, as well as to introduce the various equipment and technology used in the field.</li> <li>2. Hands-on activities: Students can participate in hands-on activities, such as using drones to capture aerial images or thermal cameras to capture thermal images. These activities can help students gain practical experience and develop technical skills.</li> <li>3. Case studies and real-world examples: Instructors can use case studies and real-world examples to illustrate the applications of aerial and thermal photography in various fields, such as agriculture, environmental monitoring, and urban planning.</li> <li>4. Group discussions and debates: Group discussions and debates can help students develop critical thinking skills and engage in meaningful discussions about the ethical and legal considerations of aerial and thermal photography.</li> <li>5. Assignments and projects: Assignments and projects can be used to assess students' understanding of the concepts and principles of aerial and thermal photography, as well as their ability to apply their knowledge in real-world scenarios.</li> <li>6. Guest lectures and field trips: Guest lectures from experts in the field of aerial and thermal photography, as well as field trips to sites where aerial and thermal photography is used, can provide students with valuable insights and firsthand experience.</li> <li>7. Online resources: Instructors can provide students with access to online resources such as videos, tutorials, and articles to supplement their learning and provide additional information.</li> <li>8. Feedback and assessment: Regular feedback and assessment can help students understand their progress and identify areas for improvement, as well as provide instructors with insights into the effectiveness of their teaching strategies.</li> </ol> |
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### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |   |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 109 | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 7 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 91  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 6 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |   |

### Module Evaluation

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|               | Material Covered                                                                                                                                                                                                                                                           |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b> | Introduction to Aerial and Thermal Photography<br>- Definition and basic principles of aerial and thermal photography<br>- Types of cameras and sensors used in aerial and thermal photography<br>- Applications and benefits of aerial and thermal photography technology |
| <b>Week 2</b> | Aerial Photography Platforms and Equipment<br>- Drones and their components                                                                                                                                                                                                |

|                |                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <ul style="list-style-type: none"> <li>- Fixed-wing aircraft and their components</li> <li>- Satellites and their components</li> <li>- Cameras, sensors, and other equipment used in aerial photography</li> </ul>                                                                                                                                                                                                       |
| <b>Week 3</b>  | <p>Photogrammetry and Georeferencing</p> <ul style="list-style-type: none"> <li>- Principles of photogrammetry</li> <li>- Georeferencing techniques and applications</li> <li>- Creating accurate and precise maps using aerial photography</li> </ul>                                                                                                                                                                    |
| <b>Week 4</b>  | <p>Thermal Imaging</p> <ul style="list-style-type: none"> <li>- Basic principles of thermal imaging</li> <li>- Applications of thermal imaging in various fields</li> <li>- Interpreting thermal images and identifying thermal patterns</li> </ul>                                                                                                                                                                       |
| <b>Week 5</b>  | <p>: Image Interpretation and Analysis</p> <ul style="list-style-type: none"> <li>- Identifying key features in aerial and thermal images</li> <li>- Interpreting images to gain insights into various fields such as agriculture, environmental studies, and urban planning</li> <li>- Using GIS software to analyze and interpret aerial and thermal images</li> </ul>                                                  |
| <b>Week 6</b>  | <p>Image Processing and Analysis</p> <ul style="list-style-type: none"> <li>- Processing and analyzing aerial and thermal images using various software tools and techniques</li> <li>- Creating 3D models from aerial images</li> <li>- Programming languages and tools for image processing and analysis</li> </ul>                                                                                                     |
| <b>Week 7</b>  | <p>Legal and Ethical Considerations</p> <ul style="list-style-type: none"> <li>- Regulations and guidelines related to the use of drones and other aerial platforms</li> <li>- Privacy concerns related to aerial photography</li> <li>- Safety considerations and guidelines for aerial photography</li> </ul>                                                                                                           |
| <b>Week 8</b>  | <p>Applications of Aerial and Thermal Photography in Agriculture</p> <ul style="list-style-type: none"> <li>- Monitoring crop health and yield using aerial photography</li> <li>- Using thermal imaging to optimize irrigation and detect water stress in crops</li> <li>- Mapping and surveying farmland using aerial photography</li> </ul>                                                                            |
| <b>Week 9</b>  | <p>Applications of Aerial and Thermal Photography in Environmental Monitoring</p> <ul style="list-style-type: none"> <li>- Monitoring wildlife populations and habitats using aerial photography</li> <li>- Detecting changes in land use and identifying environmental hazards using aerial photography</li> <li>- Using thermal imaging to detect changes in water temperature and pollution in water bodies</li> </ul> |
| <b>Week 10</b> | <p>Applications of Aerial and Thermal Photography in Urban Planning and Development</p>                                                                                                                                                                                                                                                                                                                                   |

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <ul style="list-style-type: none"> <li>- Creating 3D models of urban areas using aerial photography</li> <li>- Using thermal imaging to identify areas of heat loss in buildings and improve energy efficiency</li> <li>- Mapping and surveying urban infrastructure using aerial photography</li> </ul>                                                                                                                         |
| <b>Week 11</b> | <p>Applications of Aerial and Thermal Photography in Archaeology and Geology</p> <ul style="list-style-type: none"> <li>- Mapping and surveying archaeological sites using aerial photography</li> <li>- Identifying buried structures and features using aerial photography</li> <li>- Using thermal imaging to detect changes in soil temperature and locate underground water sources</li> </ul>                              |
| <b>Week 12</b> | <p>Applications of Aerial and Thermal Photography in Disaster Response</p> <ul style="list-style-type: none"> <li>- Assessing damage and identifying areas of need using aerial photography</li> <li>- Locating survivors and detecting areas of heat using thermal imaging</li> <li>- Monitoring disaster zones and environmental impacts using aerial photography</li> </ul>                                                   |
| <b>Week 13</b> | <p>Applications of Aerial and Thermal Photography in Wildlife Conservation</p> <ul style="list-style-type: none"> <li>- Tracking the movement of wildlife and monitoring changes in habitat using aerial photography</li> <li>- Detecting animal activity at night and identifying areas of animal concentration using thermal imaging</li> <li>- Mapping and surveying wildlife populations using aerial photography</li> </ul> |
| <b>Week 14</b> | <p>Future Trends and Innovations in Aerial and Thermal Photography</p> <ul style="list-style-type: none"> <li>- Emerging technologies in aerial and thermal photography</li> <li>- Potential applications of aerial and thermal photography in the future</li> <li>- Challenges and opportunities in the field of aerial and thermal photography</li> </ul>                                                                      |
| <b>Week 15</b> | <p>Review and Assessment</p> <ul style="list-style-type: none"> <li>- Review of course concepts and principles</li> <li>- Assessment of student learning through exams, assignments, or projects</li> </ul>                                                                                                                                                                                                                      |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                                                                                                                                                                                                                                                                                                                                                    |

| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي للمختبر |                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                         | <b>Material Covered</b>                                                                                                                                                                                                                                                                           |
| <b>Week 1</b>                                                           | <p>Introduction to Aerial and Thermal Photography</p> <ul style="list-style-type: none"> <li>- Introduction to the lab equipment and software</li> <li>- Basic principles of aerial and thermal photography</li> <li>- Hands-on activity: Introduction to drones and flying techniques</li> </ul> |
| <b>Week 2</b>                                                           | Aerial Photography Platforms and Equipment                                                                                                                                                                                                                                                        |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <ul style="list-style-type: none"> <li>- Hands-on activity: Building and flying a drone</li> <li>- Hands-on activity: Operating a fixed-wing aircraft</li> <li>- Hands-on activity: Operating a satellite</li> </ul>                                                                                                                                                                                                                                                               |
| <b>Week 3</b> | <p>Photogrammetry and Georeferencing</p> <ul style="list-style-type: none"> <li>- Hands-on activity: Capturing aerial images for photogrammetry</li> <li>- Hands-on activity: Georeferencing aerial images using GIS software</li> <li>- Hands-on activity: Creating a 3D model from aerial images</li> </ul>                                                                                                                                                                      |
| <b>Week 4</b> | <p>Thermal Imaging</p> <ul style="list-style-type: none"> <li>- Introduction to thermal cameras and sensors</li> <li>- Hands-on activity: Capturing thermal images</li> <li>- Hands-on activity: Interpreting thermal images and identifying thermal patterns</li> </ul>                                                                                                                                                                                                           |
| <b>Week 5</b> | <p>: Image Interpretation and Analysis</p> <ul style="list-style-type: none"> <li>- Hands-on activity: Identifying key features in aerial and thermal images</li> <li>- Hands-on activity: Interpreting images to gain insights into various fields such as agriculture, environmental studies, and urban planning</li> <li>- Hands-on activity: Using GIS software to analyze and interpret aerial and thermal images</li> </ul>                                                  |
| <b>Week 6</b> | <p>Image Processing and Analysis</p> <ul style="list-style-type: none"> <li>- Introduction to image processing and analysis software</li> <li>- Hands-on activity: Processing and analyzing aerial and thermal images using various software tools and techniques</li> </ul>                                                                                                                                                                                                       |
| <b>Week 7</b> | <p>Legal and Ethical Considerations</p> <ul style="list-style-type: none"> <li>- Hands-on activity: Understanding regulations and guidelines related to the use of drones and other aerial platforms</li> <li>- Hands-on activity: Identifying privacy concerns related to aerial photography</li> <li>- Hands-on activity: Implementing safety considerations and guidelines for aerial photography</li> </ul>                                                                    |
| <b>Week 8</b> | <p>Applications of Aerial and Thermal Photography in Agriculture</p> <ul style="list-style-type: none"> <li>- Hands-on activity: Monitoring crop health and yield using aerial photography</li> <li>- Hands-on activity: Using thermal imaging to optimize irrigation and detect water stress in crops</li> <li>- Hands-on activity: Mapping and surveying farmland using aerial photography</li> </ul>                                                                            |
| <b>Week 9</b> | <p>Applications of Aerial and Thermal Photography in Environmental Monitoring</p> <ul style="list-style-type: none"> <li>- Hands-on activity: Monitoring wildlife populations and habitats using aerial photography</li> <li>- Hands-on activity: Detecting changes in land use and identifying environmental hazards using aerial photography</li> <li>- Hands-on activity: Using thermal imaging to detect changes in water temperature and pollution in water bodies</li> </ul> |

|                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <b>Week 10</b> | : Applications of Aerial and Thermal Photography in Urban Planning and Development<br>- Hands-on activity: Creating 3D models of urban areas using aerial photography<br>- Hands-on activity: Using thermal imaging to identify areas of heat loss in buildings and improve energy efficiency<br>- Hands-on activity: Mapping and surveying urban infrastructure using aerial photography                               |
| <b>Week 11</b> | Applications of Aerial and Thermal Photography in Archaeology and Geology<br>- Hands-on activity: Mapping and surveying archaeological sites using aerial photography<br>- Hands-on activity: Identifying buried structures and features using aerial photography<br>- Hands-on activity: Using thermal imaging to detect changes in soil temperature and locate underground water sources                              |
| <b>Week 12</b> | Applications of Aerial and Thermal Photography in Disaster Response<br>- Hands-on activity: Assessing damage and identifying areas of need using aerial photography<br>- Hands-on activity: Locating survivors and detecting areas of heat using thermal imaging<br>- Hands-on activity: Monitoring disaster zones and environmental impacts using aerial photography                                                   |
| <b>Week 13</b> | Applications of Aerial and Thermal Photography in Wildlife Conservation<br>- Hands-on activity: Tracking the movement of wildlife and monitoring changes in habitat using aerial photography<br>- Hands-on activity: Detecting animal activity at night and identifying areas of animal concentration using thermal imaging<br>- Hands-on activity: Mapping and surveying wildlife populations using aerial photography |
| <b>Week 14</b> | : Future Trends and Innovations in Aerial and Thermal Photography<br>- Hands-on activity: Exploring emerging technologies in aerial and thermal photography<br>- Hands-on activity: Identifying potential applications of aerial and thermal photography in the future<br>- Hands-on activity: Overcoming challenges and seizing opportunities in the field of aerial and thermal photography                           |
| <b>Week 15</b> | Review and Assessment<br>- Review of lab activities and concepts learned<br>- Assessment of student learning through lab reports or projects                                                                                                                                                                                                                                                                            |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                                                                                                                                                                                                                                                                                                                                           |

| <b>Learning and Teaching Resources</b><br>مصادر التعلم والتدريس |             |                                  |
|-----------------------------------------------------------------|-------------|----------------------------------|
|                                                                 | <b>Text</b> | <b>Available in the Library?</b> |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Required Texts</b>    | <ul style="list-style-type: none"> <li>Paul R. Wolf, Bon A. Dewitt, and Benjamin E. Wilkinson, “Elements of Photogrammetry with Applications in GIS” , 4<sup>th</sup> Ed., Copyright @ 2014 by McGraw-Hill Education</li> <li>U. Snehalatha , K. Palani Thanaraj and Kurt Ammer, “Artificial Intelligence Based Infrared Thermal Image Processing and Its Applications”, 1<sup>st</sup> Ed., @ 2023, CRC Press is an imprint of Taylor &amp; Francis Group, LLC</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | No |
| <b>Recommended Texts</b> | <ul style="list-style-type: none"> <li>James S. Aber, Irene Marzloff, Johannes B. Ries and Susan E.W. Aber, “SMALL-FORMAT AERIAL PHOTOGRAPHY AND UAS IMAGERY, Principles, Techniques, and Geoscience Applications” , Copyright @ 2019 Elsevier B.V. All rights reserved.</li> <li>Shaun Foster and David Halbstern, “Integrating 3D Modeling Photogrammetry and Design”, Copyright @ 2014 , Springer London</li> <li>Innovations in Photogrammetry and Remote Sensing: Modern Sensors, New Processing Strategies and Frontiers in Applications” , Editors; Francesco Mancini and Francesco Pirotti, Copyright @ 2022, MDPI , Basel , Beijing , Wuhan , Barcelona , Belgrade , Manchester , Tokyo , Cluj , Tianjin</li> <li>Qihao Weng , “High Spatial Resolution Remote Sensing, Data, Analysis, and Applications” , Copyright @ 2018 by Taylor &amp; Francis Group, LLC.</li> <li>Wilfried Linder, “Digital Photogrammetry: A Practical Course”, © Springer-Verlag Berlin Heidelberg 2003, 2006, 2009, 2016. <ul style="list-style-type: none"> <li>Michael Vollmer and Klaus-Peter Möllmann</li> <li>Infrared Thermal Imaging</li> <li>Fundamentals, Research and Applications</li> <li>Second Edition</li> <li>•</li> <li>© 2018 WILEY-VCH Verlag GmbH &amp; Co. KGaA,</li> <li>Boschstr. 12, 69469 Weinheim, Germany</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                    | No |
| <b>Websites</b>          | <p>Here are some websites that offer references and resources for aerial and thermal photography courses:</p> <ol style="list-style-type: none"> <li>1. Pix4D: Pix4D is a provider of drone mapping and photogrammetry software. The company's website offers a range of resources and references for drone mapping and aerial photography, including case studies, webinars, and blog articles.</li> <li>2. FLIR Systems: FLIR Systems is a manufacturer of thermal imaging cameras and sensors. The company's website provides information on their products and services, as well as case studies and articles on the use of thermal imaging in various industries.</li> <li>3. Infrared Training Center: Infrared Training Center is a provider of thermal imaging training and certification. The company's website offers a range of resources and references for thermal imaging, including webinars, articles, and case studies.</li> <li>4. American Society for Photogrammetry and Remote Sensing (ASPRS): ASPRS offers a range of resources and references for photogrammetry and remote sensing, including publications, technical papers, and conference proceedings.</li> <li>5. The Thermal Imaging Blog: The Thermal Imaging Blog is a blog that provides news, reviews, and articles on thermal imaging and related technologies. The blog offers a range of resources and references for those interested in thermal imaging.</li> </ol> <p>1. Overall, these websites provide a range of references and resources for those interested in aerial and thermal photography courses, whether for personal or professional use.</p> |    |

## Grading Scheme

### مخطط الدرجات

| Group                              | Grade                   | التقدير             | Marks %  | Definition                            |
|------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group</b><br>(50 - 100) | <b>A</b> - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                    | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                    | <b>C</b> - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                    | <b>D</b> - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                    | <b>E</b> - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group</b><br>(0 – 49)      | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                    | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                    |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

## Module Information

### معلومات المادة الدراسية

|                             |                     |                 |                               |                                                                                                                                                                                                                                                                                                        |     |
|-----------------------------|---------------------|-----------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Module Title                | Complex             |                 |                               | Module Delivery                                                                                                                                                                                                                                                                                        |     |
| Module Type                 | Basic               |                 |                               | <div><input checked="" type="checkbox"/> Theory</div> <div><input checked="" type="checkbox"/> Lecture</div> <div><input checked="" type="checkbox"/> Lab</div> <div><input type="checkbox"/> Tutorial</div> <div><input type="checkbox"/> Practical</div> <div><input type="checkbox"/> Seminar</div> |     |
| Module Code                 | UOBRS63             |                 |                               |                                                                                                                                                                                                                                                                                                        |     |
| ECTS Credits                | 5                   |                 |                               |                                                                                                                                                                                                                                                                                                        |     |
| SWL (hr/sem)                | 125                 |                 |                               |                                                                                                                                                                                                                                                                                                        |     |
| Module Level                |                     | 3               | Semester of Delivery          |                                                                                                                                                                                                                                                                                                        | 6   |
| Administering Department    |                     | Type Dept. Code | College                       | Type College Code                                                                                                                                                                                                                                                                                      |     |
| Module Leader               | هالة قحطان حمدي     |                 | e-mail                        | E-mail                                                                                                                                                                                                                                                                                                 |     |
| Module Leader’s Acad. Title |                     | Lecturer        | Module Leader’s Qualification |                                                                                                                                                                                                                                                                                                        | Msc |
| Module Tutor                | Name (if available) |                 | e-mail                        | E-mail                                                                                                                                                                                                                                                                                                 |     |
| Peer Reviewer Name          |                     | Name            | e-mail                        | E-mail                                                                                                                                                                                                                                                                                                 |     |

|                                    |            |                |     |
|------------------------------------|------------|----------------|-----|
| Scientific Committee Approval Date | 10/03/2026 | Version Number | 1.0 |
|------------------------------------|------------|----------------|-----|

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                      |      |          |  |
|----------------------|------|----------|--|
| Prerequisite module  | None | Semester |  |
| Co-requisites module | None | Semester |  |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | 1- To study the techniques of complex variables and functions together with their derivatives, Contour integration and transformations.<br>2- To study complex power series, classification of singularities, calculus of residues and its applications in the evaluation of integrals, and other concepts and properties.                                                                                                                                                                                                                    |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | The student will be able to:<br>1. Identify curves and regions in the complex plane defined by simple expressions.<br>2. Describe basic properties of complex integration and having the ability to compute such integrals.<br>3. Decide when and where a given function is analytic and be able to find its series development.<br>4. Describe conformal mappings between various plane regions.<br>5. Present the central ideas in the solution of Dirichlet's problem.<br>Give the main ideas in the proof of the Riemann mapping theorem. |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | Indicative content includes the following.<br>1- The theory and applications of complex functions.<br>2- Topics covered include analytic functions,<br>3- Taylor and Laurent series, integrals, Cauchy's theorem, residues, evaluation of certain real integrals.<br>4- Laplace transforms, conformal mappings, applications to differential equations.                                                                                                                                                                                       |

### Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

|            |                                                                                                                                                                                                                              |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strategies | Here are some learning and teaching strategies that may be effective for a course on Digital image processing :<br>1. Lectures: Lectures can provide an overview of key concepts and techniques in digital image processing. |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>2. Education: provide lectures and printed sources from the modern, diverse and rich sources including examples</p> <p>3. Education: Harnessing smart blackboard to the goal of teaching students and explain the steps the solution and extraction results</p> <p>4. Education: resolving some questions, with intent to contain mistakes and make the students extracted error</p> <p>5. Learning: asking questions and inquiries and making the student turn into a teaching explanation and solution on the blackboard at that point, brainstorming method</p> <p>6. Learning: questions directly and consequently all students to learn the extent of interaction and the rest to be paid attention to</p> <p>7. Learning: Each specific group and explain its interaction between students with questions and answers and provide an environment that enables the student to lecture management or debate.</p> <p>8. Instructors can use slides, diagrams, and other visual aids to help students understand complex topics.</p> <p>9. Online resources: Online resources such as interactive tutorials, video lectures, and online forums can supplement classroom instruction and provide students with additional opportunities to learn image processing.</p> <p>10. Assessments: Assessments can help students measure their understanding of course material and provide instructors with feedback on the effectiveness of their teaching. Assessments can include quizzes, exams, and projects. By using a combination of these learning and teaching strategies, instructors can create a dynamic and engaging learning environment that helps students develop the knowledge and skills they need to succeed in the field of complex.</p> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| <b>Student Workload (SWL)</b><br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا       |     |                                                                           |   |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 62  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 4 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 138 | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 8 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |   |

## Module Evaluation

تقييم المادة الدراسية

|                      |                 | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|----------------------|-----------------|-------------|------------------|------------|---------------------------|
| Formative assessment | Quizzes         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                      | Assignments     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                      | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                      | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| Summative assessment | Midterm Exam    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                      | Final Exam      | 3hr         | 50% (50)         | 16         | All                       |
| Total assessment     |                 |             | 100% (100 Marks) |            |                           |

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|         | Material Covered                                                    |
|---------|---------------------------------------------------------------------|
| Week 1  | 1- complex numbers                                                  |
| Week 2  | 2- Function of one complex variables.                               |
| Week 3  | 3- Limits, Continuity and differentiability.                        |
| Week 4  | 4- The Cauchy- Riemann equations with Consequences.                 |
| Week 5  | 5- Analytic and Harmonic functions                                  |
| Week 6  | 6- Elementary functions from 1 to 6                                 |
| Week 7  | 7- Complex integration.                                             |
| Week 8  | 8- Cauchy's integral theorem and integral formula with consequences |
| Week 9  | 9- Cauchy's integral theorem and integral formula with consequences |
| Week 10 | 10- Series, Taylor and Laurent series with application.             |
| Week 11 | 11- Series, Taylor and Laurent series with application.             |
| Week 12 | 12- Zeros and isolated singularities.                               |
| Week 13 | 13- Cauchy residual theorem with applications.                      |
| Week 14 | 14- Cauchy residual theorem with applications.                      |
| Week 15 | Course review, final project presentations, and exam preparation.   |

|                |                                        |
|----------------|----------------------------------------|
| <b>Week 16</b> | Preparatory week before the final Exam |
|----------------|----------------------------------------|

| <b>Learning and Teaching Resources</b><br><b>مصادر التعلم والتدريس</b> |                                                                                                                                                                                                                                                         |                                  |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
|                                                                        | <b>Text</b>                                                                                                                                                                                                                                             | <b>Available in the Library?</b> |
| <b>Required Texts</b>                                                  | 1- J.B. Conway, Functions of one Complex variable.<br>2- L. Ahlfors, Complex Analysis.<br>3- E.C. Titchmarsh, Theory of functions.<br>4- J Kasana H.S., Complex Variables: Theory and Applications, Prentice-Hall of India Pvt. Ltd, 2nd edition, 2005. | Yes                              |
| <b>Recommended Texts</b>                                               | 1. S. Lang, Complex Analysis.<br>2. E. Hille, Analytic function theory.<br>3. Dr. H. K. Pathak, Complex Analysis, Shiksha Sahitya publication 2/e, 2007.                                                                                                | No                               |
| <b>Websites</b>                                                        | <a href="http://people.math.gatech.edu/~cain/winter99/complex.html">people.math.gatech.edu/~cain/winter99/complex.html</a><br>– <a href="#">Rudy the Reindeer</a><br>May 10, 2014 at 18:30                                                              |                                  |

| <b>Grading Scheme</b><br><b>مخطط الدرجات</b> |                         |                     |                |                                       |
|----------------------------------------------|-------------------------|---------------------|----------------|---------------------------------------|
| <b>Group</b>                                 | <b>Grade</b>            | <b>التقدير</b>      | <b>Marks %</b> | <b>Definition</b>                     |
| <b>Success Group</b><br><b>(50 - 100)</b>    | <b>A - Excellent</b>    | امتياز              | 90 - 100       | Outstanding Performance               |
|                                              | <b>B - Very Good</b>    | جيد جدا             | 80 - 89        | Above average with some errors        |
|                                              | <b>C - Good</b>         | جيد                 | 70 - 79        | Sound work with notable errors        |
|                                              | <b>D - Satisfactory</b> | متوسط               | 60 - 69        | Fair but with major shortcomings      |
|                                              | <b>E - Sufficient</b>   | مقبول               | 50 - 59        | Work meets minimum criteria           |
| <b>Fail Group</b><br><b>(0 - 49)</b>         | <b>FX – Fail</b>        | راسب (قيد المعالجة) | (45-49)        | More work required but credit awarded |
|                                              | <b>F – Fail</b>         | راسب                | (0-44)         | Considerable amount of work required  |
|                                              |                         |                     |                |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

| Module Information                 |                                                      |                      |                                                                                                                                                                                                                                                     |        |
|------------------------------------|------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| معلومات المادة الدراسية            |                                                      |                      |                                                                                                                                                                                                                                                     |        |
| Module Title                       | GIS software packages                                |                      | Module Delivery                                                                                                                                                                                                                                     |        |
| Module Type                        | Core                                                 |                      | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |        |
| Module Code                        | UOBR64                                               |                      |                                                                                                                                                                                                                                                     |        |
| ECTS Credits                       | 7                                                    |                      |                                                                                                                                                                                                                                                     |        |
| SWL (hr/sem)                       | 175                                                  |                      |                                                                                                                                                                                                                                                     |        |
| Module Level                       | 3                                                    | Semester of Delivery |                                                                                                                                                                                                                                                     | 6      |
| Administering Department           | Type Dept. Code                                      | College              | Type College Code                                                                                                                                                                                                                                   |        |
| Module Leader                      | Name                                                 |                      | e-mail                                                                                                                                                                                                                                              | E-mail |
| Module Leader's Acad. Title        | Professor                                            |                      | Module Leader's Qualification                                                                                                                                                                                                                       | Ph.D.  |
| Module Tutor                       | م. م. ريم شهاب<br>م. م. قصي نعمه<br>م. م. مصطفى عماد |                      | e-mail                                                                                                                                                                                                                                              | E-mail |
| Peer Reviewer Name                 | Name                                                 |                      | e-mail                                                                                                                                                                                                                                              | E-mail |
| Scientific Committee Approval Date | 10/03/2026                                           |                      | Version Number                                                                                                                                                                                                                                      | 1.0    |

| Relation with other Modules       |                 |  |          |
|-----------------------------------|-----------------|--|----------|
| العلاقة مع المواد الدراسية الأخرى |                 |  |          |
| Prerequisite module               | None            |  | Semester |
| Co-requisites module              | GIS programming |  | Semester |

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

#### Module Objectives

أهداف المادة الدراسية

1. Understand the basic concepts of GIS: Before learning any GIS software package, it's important to have a basic understanding of GIS concepts such as spatial data, coordinate systems, and geospatial analysis.
2. Learn how to use GIS software: A key learning objective is to become proficient in using a GIS software package. This includes learning how to import data, create maps, perform spatial analysis, and generate reports.
3. Understand data management in GIS: GIS software packages rely heavily on data management, so an important learning objective is to understand how to organize, store, and retrieve spatial data. This includes learning about data formats, data quality, and metadata.
4. Learn how to perform spatial analysis: GIS software packages offer a range of spatial analysis tools, so a key learning objective is to become proficient in using these tools to perform various types of analysis such as proximity analysis, overlay analysis, and network analysis.
5. Understand how to create maps: A key output of GIS software packages is the creation of maps. Therefore, a learning objective is to understand how to create maps that effectively communicate spatial information to various audiences.
6. Learn how to integrate GIS with other software: GIS software packages often need to be integrated with other software tools such as databases, office software, and web applications. Therefore, a learning objective is to understand how to integrate GIS with other software tools.
7. Understand the applications of GIS: GIS software packages are used in various industries and applications such as urban planning, environmental management, and transportation. Therefore, a learning objective is to understand the applications of GIS and how GIS can be used to solve spatial problems in various industries.

#### Module Learning Outcomes

مخرجات التعلم للمادة الدراسية

- By learning GIS (Geographic Information System) software packages, the student can expect to achieve the following outcomes:
1. Ability to create and edit spatial data: You will learn how to create and edit spatial data such as points, lines, and polygons using GIS software packages. This will enable you to accurately represent and analyze geographic information.
  2. Understanding of spatial analysis techniques: You will learn various spatial analysis techniques such as buffering, overlaying, and network analysis. This will help you analyze complex spatial relationships and make informed decisions.
  3. Familiarity with data visualization tools: You will learn how to use GIS software packages to create maps and other visualizations that represent spatial data effectively. This will help you communicate complex spatial relationships to others.
  4. Knowledge of data management: You will learn how to manage spatial data effectively, including data storage, retrieval, and conversion. This will help you organize and access data efficiently.
  5. Ability to work with diverse data sources: You will learn how to work with diverse data sources such as satellite imagery, aerial photography, and GPS data. This will enable you to integrate different types of data into your analysis and visualization.

|                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                              | <p>6. Familiarity with industry-standard GIS software: You will learn how to use industry-standard GIS software packages such as ArcGIS, QGIS, and GRASS GIS. This will enable you to work with GIS professionals and collaborate on GIS projects.</p> <p>7. Understanding of GIS applications: You will learn how GIS is used in various applications such as environmental management, urban planning, and disaster management. This will help you understand the practical applications of GIS in different fields.</p> <p>Overall, learning GIS software packages will equip student with the skills and knowledge needed to work with spatial data effectively and make informed decisions based on geographic information.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p> | <p>The indicative contents of learning GIS software packages typically include the following:</p> <ol style="list-style-type: none"> <li>1. Introduction to GIS: This topic covers the fundamental concepts of GIS, including spatial data, coordinate systems, data types, and GIS applications. It also introduces students to the different types of GIS software packages available in the market.</li> <li>2. Spatial data creation and management: This topic covers the creation and management of spatial data, including data input, data editing, digitization, and georeferencing. It also covers issues related to data quality, accuracy, and metadata.</li> <li>3. Spatial analysis techniques: This topic covers the different spatial analysis techniques available in GIS software packages, including buffering, overlaying, proximity analysis, and network analysis. It also covers the applications of these techniques in different fields.</li> <li>4. Data visualization: This topic covers the different data visualization tools available in GIS software packages, including maps, charts, and graphs. It also covers techniques for creating effective visualizations and designing cartographic products.</li> <li>5. Spatial data storage and retrieval: This topic covers the different methods of spatial data storage and retrieval, including file formats, databases, and data sharing. It also covers issues related to data security, privacy, and ethics.</li> <li>6. Working with different data sources: This topic covers the different types of data sources available in GIS, including satellite imagery, aerial photography, LiDAR, and GPS data. It also covers techniques for integrating different types of data and dealing with data heterogeneity.</li> <li>7. GIS software packages: This topic covers the different GIS software packages available, including commercial, open-source, and cloud-based solutions. It also covers the features, functionalities, and licensing options of different software packages.</li> <li>8. GIS applications: This topic covers the different applications of GIS in different fields, including environmental management, urban planning, public health, and emergency management. It also covers case studies of GIS applications in different parts of the world.</li> </ol> <p>Overall, the indicative contents of learning GIS software packages provide a comprehensive and interdisciplinary approach to GIS, covering the theoretical and practical aspects of spatial data management, analysis, visualization, and applications.</p> |

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <p>Learning and teaching strategies for GIS software packages typically include the following:</p> <ol style="list-style-type: none"> <li>1. <b>Lectures:</b> Lectures are used to introduce students to the fundamental concepts and theories of GIS, including spatial data, coordinate systems, data types, and GIS applications. Lectures can be delivered in person or online, and may include multimedia components such as videos, slides, and animations.</li> <li>2. <b>Demonstrations:</b> Demonstrations are used to show students how to use GIS software packages to perform specific tasks, such as data input, data editing, spatial analysis, and data visualization. Demonstrations can be conducted in person or via screencasts, and may include step-by-step instructions and examples.</li> <li>3. <b>Hands-on exercises:</b> Hands-on exercises are used to provide students with practical experience in using GIS software packages. Exercises can be done individually or in groups, and may involve working with real-world data sets and solving spatial problems.</li> <li>4. <b>Case studies:</b> Case studies are used to demonstrate the practical applications of GIS in different fields, including environmental management, urban planning, public health, and emergency management. Case studies can be presented in lectures, readings, or online videos, and may involve guest speakers from industry or government.</li> <li>5. <b>Group projects:</b> Group projects are used to encourage collaboration and teamwork among students, and to allow them to apply GIS skills to real-world problems. Group projects can involve data collection, analysis, and visualization, and may culminate in a final presentation or report.</li> <li>6. <b>Online resources:</b> Online resources such as tutorials, user manuals, and forums are used to provide students with additional support and guidance in using GIS software packages. Online resources can be accessed anytime and anywhere, and can provide students with a self-paced learning experience.</li> </ol> |
|                   | <p>Overall, learning and teaching strategies for GIS software packages aim to provide students with a comprehensive and hands-on learning experience, combining theoretical knowledge with practical skills and real-world applications.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |   |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 109 | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 7 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 91  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 6 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |   |

### Module Evaluation

| تقييم المادة الدراسية |                 |             |                  |            |                           |
|-----------------------|-----------------|-------------|------------------|------------|---------------------------|
|                       |                 | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
| Formative assessment  | Quizzes         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                       | Assignments     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                       | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                       | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| Summative assessment  | Midterm Exam    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                       | Final Exam      | 3hr         | 50% (50)         | 16         | All                       |
| Total assessment      |                 |             | 100% (100 Marks) |            |                           |

| Delivery Plan (Weekly Syllabus) |                                                                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| المنهاج الاسبوعي النظري         |                                                                                                                                                                                                                                                   |
|                                 | Material Covered                                                                                                                                                                                                                                  |
| Week 1                          | Introduction to GIS<br>- Lecture: Introduction to GIS concepts and applications<br>- Demonstration: Overview of GIS software packages<br>- Hands-on exercise: Installing and setting up GIS software<br>- Reading: Introduction to GIS, Chapter 1 |
| Week 2                          | Spatial data creation and management<br>- Lecture: Spatial data types and coordinate systems<br>- Demonstration: Data input and editing<br>- Hands-on exercise: Creating and editing spatial data<br>- Reading: Getting to Know ArcGIS, Chapter 2 |
| Week 3                          | Spatial analysis techniques<br>- Lecture: Spatial analysis concepts and techniques<br>- Demonstration: Buffering and overlaying<br>- Hands-on exercise: Spatial analysis using GIS software<br>- Reading: GIS Fundamentals, Chapter 5             |
| Week 4                          | Data visualization<br>- Lecture: Cartographic design and map elements<br>- Demonstration: Creating maps and charts<br>- Hands-on exercise: Designing and presenting a map<br>- Reading: Cartography: Thematic Map Design, Chapter 4               |
| Week 5                          | Spatial data storage and retrieval<br>- Lecture: Data storage and retrieval concepts<br>- Demonstration: File formats and databases<br>- Hands-on exercise: Storing and retrieving spatial data<br>- Reading: GIS Fundamentals, Chapter 12        |

|                |                                                                                                                                                                                                                                                                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 6</b>  | <p>Working with different data sources</p> <ul style="list-style-type: none"> <li>- Lecture: Remote sensing and GPS data</li> <li>- Demonstration: Integrating different data sources</li> <li>- Hands-on exercise: Working with satellite imagery and GPS data</li> <li>- Reading: Getting to Know ArcGIS, Chapter 3</li> </ul>                        |
| <b>Week 7</b>  | <p>GIS software packages</p> <ul style="list-style-type: none"> <li>- Lecture: Features and functionalities of GIS software packages</li> <li>- Demonstration: Comparison of different GIS software packages</li> <li>- Hands-on exercise: Using different GIS software packages</li> <li>- Reading: The GIS 20: Essential Skills, Chapter 1</li> </ul> |
| <b>Week 8</b>  | <p>GIS applications</p> <ul style="list-style-type: none"> <li>- Lecture: GIS applications in different fields</li> <li>- Demonstration: Case studies of GIS applications</li> <li>- Hands-on exercise: Using GIS for a real-world problem</li> <li>- Reading: GIS Fundamentals, Chapter 16</li> </ul>                                                  |
| <b>Week 9</b>  | <p>Spatial statistics</p> <ul style="list-style-type: none"> <li>- Lecture: Spatial statistics concepts and methods</li> <li>- Demonstration: Descriptive and inferential statistics</li> <li>- Hands-on exercise: Spatial statistics using GIS software</li> <li>- Reading: GIS Fundamentals, Chapter 7</li> </ul>                                     |
| <b>Week 10</b> | <p>Geodatabases</p> <ul style="list-style-type: none"> <li>- Lecture: Geodatabase design and management</li> <li>- Demonstration: Creating and using geodatabases</li> <li>- Hands-on exercise: Geodatabase design and management</li> <li>- Reading: Getting to Know ArcGIS, Chapter 6</li> </ul>                                                      |
| <b>Week 11</b> | <p>Geoprocessing</p> <ul style="list-style-type: none"> <li>- Lecture: Geoprocessing concepts and tools</li> <li>- Demonstration: Using geoprocessing tools</li> <li>- Hands-on exercise: Geoprocessing using GIS software</li> <li>- Reading: GIS Fundamentals, Chapter 8</li> </ul>                                                                   |
| <b>Week 12</b> | <p>Web GIS</p> <ul style="list-style-type: none"> <li>- Lecture: Web GIS concepts and applications</li> <li>- Demonstration: Building a web map</li> <li>- Hands-on exercise: Creating a web map using GIS software</li> <li>- Reading: The GIS 20: Essential Skills, Chapter 18</li> </ul>                                                             |
| <b>Week 13</b> | <p>Lidar and 3D analysis</p> <ul style="list-style-type: none"> <li>- Lecture: Lidar data and 3D analysis</li> <li>- Demonstration: Working with Lidar data</li> <li>- Hands-on exercise: 3D analysis using GIS software</li> <li>- Reading: GIS Fundamentals, Chapter 14</li> </ul>                                                                    |
| <b>Week 14</b> | <p>Mobile GIS</p> <ul style="list-style-type: none"> <li>- Lecture: Mobile GIS concepts and applications</li> <li>- Demonstration: Mobile data collection using GIS software</li> <li>- Hands-on exercise: Mobile data collection using GIS software</li> <li>- Reading: Mobile GIS, Chapter 2</li> </ul>                                               |
| <b>Week 15</b> | <p>Spatial modeling</p> <ul style="list-style-type: none"> <li>- Lecture: Spatial modeling concepts and methods</li> <li>- Demonstration: Building a spatial model</li> <li>- Hands-on exercise: Building a spatial model using GIS software</li> <li>- Reading: GIS Fundamentals, Chapter 9</li> </ul>                                                 |
| <b>Week 16</b> | <p>Preparatory week before the final Exam</p>                                                                                                                                                                                                                                                                                                           |

## Delivery Plan (Weekly Lab. Syllabus)

### المنهاج الاسبوعي للمختبر

|                   | Material Covered                                                                                                                                                                                                                    |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>     | Introduction to GIS software packages<br>- Overview of GIS software packages in the market<br>- Understanding the differences between open-source and proprietary GIS software<br>- Introduction to QGIS and ArcGIS                 |
| <b>Week 2-3</b>   | Week 2-3: QGIS<br>- Installation and configuration of QGIS<br>- Basic operations in QGIS (adding data, creating layers, symbolizing data)<br>- Geoprocessing and spatial analysis in QGIS<br>- Map layout and printing in QGIS      |
| <b>Week 4-5</b>   | ArcGIS<br>- Installation and configuration of ArcGIS<br>- Basic operations in ArcGIS (adding data, creating layers, symbolizing data)<br>- Geoprocessing and spatial analysis in ArcGIS<br>- Map layout and printing in ArcGIS      |
| <b>Week 6-7</b>   | Spatial Analysis in QGIS<br>- Spatial analysis using QGIS tools (buffering, intersection, union, etc.)<br>- Advanced spatial analysis in QGIS (interpolation, georeferencing, etc.)<br>- Introduction to plugins in QGIS            |
| <b>Week 8-9</b>   | Spatial Analysis in ArcGIS<br>- Spatial analysis using ArcGIS tools (buffering, intersection, union, etc.)<br>- Advanced spatial analysis in ArcGIS (interpolation, georeferencing, etc.)<br>- Introduction to extensions in ArcGIS |
| <b>Week 10-11</b> | Remote Sensing in QGIS<br>- Introduction to remote sensing concepts<br>- Processing and analyzing remote sensing data in QGIS<br>- Image classification in QGIS                                                                     |
| <b>Week 12-13</b> | Remote Sensing in ArcGIS<br>- Processing and analyzing remote sensing data in ArcGIS<br>- Image classification in ArcGIS                                                                                                            |
| <b>Week 14-15</b> | Web GIS<br>- Introduction to web GIS concepts<br>- Creating web maps using QGIS and ArcGIS<br>- Publishing web maps using QGIS and ArcGIS                                                                                           |

## Learning and Teaching Resources

### مصادر التعلم والتدريس

|                       | Text                                                                                                                                                                                                                                                                                                                                                                                                                                              | Available in the Library? |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b> | The required texts for GIS software packages may vary depending on the specific software and the level of expertise of the user. Here are some commonly recommended texts for popular GIS software packages:<br>1. ArcGIS: "Getting to Know ArcGIS" by Michael Law and Amy Collins is a comprehensive guide to using ArcGIS for geospatial analysis, data management, and map creation. "The ESRI Guide to GIS Analysis, Volume 1" and "Volume 2" | No                        |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
|                          | <p>by Andy Mitchell provide in-depth coverage of GIS analysis techniques using ArcGIS.</p> <ol style="list-style-type: none"> <li>2. QGIS: "QGIS Map Design" by Anita Graser is a comprehensive guide to creating effective maps using QGIS. "Mastering QGIS" by Kurt Menke, GISP, Dr. Richard Smith Jr., GISP, and Dr. Luigi Pirelli provides in-depth coverage of QGIS tools and techniques for geospatial analysis, data management, and map creation.</li> <li>3. AutoCAD Map 3D: "Mastering AutoCAD Map 3D" by Brian M. Curran provides a comprehensive guide to using AutoCAD Map 3D for geospatial analysis, data management, and map creation.</li> <li>4. CityEngine: "Procedural City Generation" by Y. Liu and A. Zeng provides an in-depth guide to using CityEngine for 3D urban modeling and visualization.</li> </ol> <p>In addition to these texts, there are many online resources, tutorials, and forums available for GIS software packages that can be helpful for beginners and advanced users alike.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |
| <b>Recommended Texts</b> | <p>In addition to the required texts, there are several recommended texts for GIS software packages that can help users develop advanced skills and knowledge. Here are some commonly recommended texts for popular GIS software packages:</p> <ol style="list-style-type: none"> <li>1. ArcGIS: "GIS Tutorial 1: Basic Workbook" by Wilpen L. Gorr and Kristen S. Kurland provides a step-by-step introduction to GIS concepts and how to use ArcGIS for spatial analysis and map creation. "GIS Fundamentals: A First Text on Geographic Information Systems" by Paul Bolstad is a comprehensive textbook that covers GIS concepts and theory, as well as practical applications using ArcGIS.</li> <li>2. QGIS: "Discover QGIS" by Kurt Menke, GISP, Dr. Richard Smith Jr., GISP, and Dr. Luigi Pirelli provides a hands-on guide to using QGIS for geospatial analysis, data management, and map creation. "The PyQGIS Programmer's Guide" by Gary Sherman provides an in-depth guide to using Python with QGIS to automate geospatial analysis and map creation.</li> <li>3. AutoCAD Map 3D: "AutoCAD Map 3D 2021: Essentials" by Autodesk provides a comprehensive guide to using AutoCAD Map 3D for geospatial analysis, data management, and map creation.</li> <li>4. CityEngine: "Advanced 3D Game Programming with DirectX 10.0" by Peter Walsh provides an in-depth guide to using CityEngine for 3D urban modeling and visualization, with a focus on game development.</li> </ol> <p>Overall, these recommended texts can help users develop advanced skills and knowledge in GIS software packages, and provide a solid foundation for further learning and exploration.</p> | No |
| <b>Websites</b>          | <ol style="list-style-type: none"> <li>1. ArcGIS: The official website for ArcGIS is <a href="https://www.esri.com/en-us/arcgis/products/arcgis-pro/overview">https://www.esri.com/en-us/arcgis/products/arcgis-pro/overview</a>. It provides information on the latest product versions, features, and pricing options. The website also includes resources such as tutorials, documentation, and support forums to help users get started with ArcGIS.</li> <li>2. QGIS: The official website for QGIS is <a href="https://www.qgis.org/en/site/">https://www.qgis.org/en/site/</a>. It provides information on the latest product versions, features, and plugins. The website also includes resources such as tutorials, documentation, and support forums to help users get started with QGIS.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 3. AutoCAD Map 3D: The official website for AutoCAD Map 3D is <a href="https://www.autodesk.com/products/autocad-map-3d/overview">https://www.autodesk.com/products/autocad-map-3d/overview</a> . It provides information on the latest product versions, features, and pricing options. The website also includes resources such as tutorials, documentation, and support forums to help users get started with AutoCAD Map 3D. |
|  | 4. CityEngine: The official website for CityEngine is <a href="https://www.esri.com/en-us/arcgis/products/cityengine/overview">https://www.esri.com/en-us/arcgis/products/cityengine/overview</a> . It provides information on the latest product versions, features, and pricing options. The website also includes resources such as tutorials, documentation, and support forums to help users get started with CityEngine.   |

| Grading Scheme<br>مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                       |                  |                     |          |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|----------|---------------------------------------|
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade            | التقدير             | Marks %  | Definition                            |
| <b>Success Group</b><br>(50 - 100)                                                                                                                                                                                                                                                                                                                                                   | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group</b><br>(0 – 49)                                                                                                                                                                                                                                                                                                                                                        | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                                                                                                                                                                                                                                                                                                                                                                      |                  |                     |          |                                       |
| <b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |                  |                     |          |                                       |

| Module Information<br>معلومات المادة الدراسية |                             |                                                                                                                                                                                               |
|-----------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module Title                                  | <b>Research Methodology</b> | Module Delivery                                                                                                                                                                               |
| Module Type                                   | <b>Supplement</b>           | <input checked="" type="checkbox"/> Theory<br><input type="checkbox"/> Lecture<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code                                   | <b>UOB309</b>               |                                                                                                                                                                                               |
| ECTS Credits                                  | <b>1</b>                    |                                                                                                                                                                                               |
| SWL (hr/sem)                                  | <b>25</b>                   |                                                                                                                                                                                               |

|                                    |                      |                                      |                             |
|------------------------------------|----------------------|--------------------------------------|-----------------------------|
| <b>Module Level</b>                | 3                    | <b>Semester of Delivery</b>          | 6                           |
| <b>Administering Department</b>    | Type Dept. Code      | <b>College</b>                       | Type College Code           |
| <b>Module Leader</b>               | زهراء نجم عبد الامير | <b>e-mail</b>                        |                             |
| <b>Module Leader's Acad. Title</b> | Professor            | <b>Module Leader's Qualification</b> | Ph.D.                       |
| <b>Module Tutor</b>                | None                 | <b>e-mail</b>                        | None                        |
| <b>Peer Reviewer Name</b>          |                      | <b>e-mail</b>                        | auday.h@sc.uobaghdad.edu.iq |
| <b>Review Committee Approval</b>   | 10/03/2026           | <b>Version Number</b>                | 1.0                         |

### Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

|                             |      |                 |  |
|-----------------------------|------|-----------------|--|
| <b>Prerequisite module</b>  | None | <b>Semester</b> |  |
| <b>Co-requisites module</b> | None | <b>Semester</b> |  |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Aims</b><br>أهداف المادة الدراسية                      | <ul style="list-style-type: none"> <li>Preparing the student to the basic principles of the scientific method and to be able to locate information necessary to conduct research.</li> <li>Teaching the student to be capable of critically reviewing research.</li> <li>Give a knowledge to write a good scientific paper and reports and to present findings to colleagues. Also understand the ethics.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"> <li>The student will acquire knowledge of the basic principles of the scientific method.</li> <li>The student will be able to locate information necessary to conduct research, to use computerized databases, and be familiar with psychology web-based resources.</li> <li>The student will be capable of critically reviewing research reports and to synthesize a body of literature.</li> <li>The student will be able to develop testable hypotheses.</li> <li>The student will be knowledgeable of general research designs, experimental methods, and good research practices. They will be able to select appropriate experimental designs to test hypotheses.</li> <li>The student will understand the ethical treatment of human and animal participants in research and will be knowledgeable of the institutional requirements for conducting research.</li> <li>The student will be able to conduct simple statistical analyses of data and to interpret the results of the analyses.</li> </ol> |

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   | <p>8. The student will be able to draw conclusions from the research and to assess the generalizability of study results.</p> <p>9. The student will be able to write research reports and to present findings to colleagues.</p>                                                                                                                                                                                             |
| <b>Indicative Contents</b><br>المحتويات الإرشادية | <p>Quantitative research is about the collection and analysis of numerical data. It typically involves the collection of data through methods like surveys. Researchers analyze that data through various methods of mathematical and statistical analysis. Quantitative research is done in a wide range of fields, such as economics, marketing, public health, and psychology, and includes methods like the following</p> |

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <p>The main strategy that will be adopted in delivering this module is to encourage students' participation in the discussions, dialogues and group work lectures &amp; exercises, while at the same time refining and expanding their critical thinking skills. There are many teaching and learning methods used, and the most important of these methods are:</p> <p>Theoretical lecture, discussion and dialogue, panel discussions on certain topics, theoretical student research</p> <p>Library and electronic activities (which helps students to reach the following results:</p> <ol style="list-style-type: none"> <li>1- The scientific ability to distinguish between correct information and wrong information.</li> <li>2- Ease of scientific drafting and ease of correction.</li> <li>3. Ability to memorize and guess.</li> <li>4- The ability to link concepts and principles with reality.</li> <li>5. Ability to invoke, link, interpret.</li> </ol> |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

#### الحمل الدراسي للطالب

|                                                                                |    |                                                                           |     |
|--------------------------------------------------------------------------------|----|---------------------------------------------------------------------------|-----|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 16 | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 1   |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 9  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 0.6 |
| <b>Total SWL (h/sem)</b>                                                       | 25 |                                                                           |     |

## Module Evaluation

## تقييم المادة الدراسية

|                      |                    | Time/Number | Weight (Marks)   | Week Due | Relevant Learning Outcome |
|----------------------|--------------------|-------------|------------------|----------|---------------------------|
| Formative assessment | Quizzes            | 2           | 10% (10)         | 5, 10    | LO #1, 2, 10 and 11       |
|                      | Assignments        | 2           | 10% (10)         | 2, 12    | LO # 3, 4, 6 and 7        |
|                      | Attending lectures | 1           | 10%(10)          | all      | continue                  |
|                      | Report             | 1           | 10% (10)         | 13       | LO # 5, 8 and 10          |
| Summative assessment | Midterm Exam       | 2 hr        | 10% (10)         | 7        | LO # 1-7                  |
|                      | Final Exam         | 2hr         | 50% (50)         | 16       | All                       |
| Total assessment     |                    |             | 100% (100 Marks) |          |                           |

## Delivery Plan (Weekly Syllabus)

## المنهاج الاسبوعي النظري مادة منهجية البحث

|        | Material Covered                                                                                                                 | <u>Research Methodology</u> |
|--------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Week 1 | 1. <b>Research Methodology:</b><br>(a) A review of the Fundamentals<br>(b) Definitions of Research<br>(c) Objectives of Research |                             |
| Week 2 | (a) Motivation in Research<br>(b) General Characteristics of Research<br>(c) Types of Research                                   |                             |
| Week 3 | 2. <b>The Research Problem</b><br>(a) What is a Research Problem<br>(b) Selecting the Problem                                    |                             |
| Week 4 | (a) Sources of the Problem<br>(b) Statement of a Problem<br>(c) Evaluation of a Problem                                          |                             |
| Week 5 | 3. <b>The Review of Literature</b><br>(a) Meaning of Review of Literature<br>(b) Objectives of Review of Literature              |                             |
| Week 6 | (a) Sources of Literature<br>(b) Reporting the Review of Literature                                                              |                             |

|                |                                                                                                                                                                                           |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 7</b>  | <b>4. The Research Approach</b><br>(a) The Qualitative Approach<br>(b) The Quantitative Approach                                                                                          |
| <b>Week 8</b>  | (a) The Mixed-Methods Approach<br>(b) Criteria for Selecting a Research Approach                                                                                                          |
| <b>Week 9</b>  | <b>5. Data Collection Methods</b><br>(a) Questionnaires<br>(b) Interviews                                                                                                                 |
| <b>Week 10</b> | (a) Focus Groups<br>(b) Observation                                                                                                                                                       |
| <b>Week 11</b> | <b>1. Sampling</b><br>(a) Meaning and Definition of Sampling                                                                                                                              |
| <b>Week 12</b> | (a) Functions of Population and Sampling<br>(b) Methods of Sampling                                                                                                                       |
| <b>Week 13</b> | <b>1. Preparation of the Research</b><br>(a) Characteristics of a Good Research Title                                                                                                     |
| <b>Week 14</b> | (b) Structure of research paper:<br>(1) Abstract<br>(2) Introductions<br>(3) Review of the literature<br>(4) Methodology<br>(5) Result & Discussions<br>(6) Conclusions<br>(7) References |
| <b>Week 15</b> | <b>Preparatory Week</b>                                                                                                                                                                   |
| <b>Week 16</b> | <b>Final Exam</b>                                                                                                                                                                         |

| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي للمختبر |                         |
|-------------------------------------------------------------------------|-------------------------|
|                                                                         | <b>Material Covered</b> |
| <b>Week 1</b>                                                           |                         |

| <b>Learning and Teaching Resources</b><br>مصادر التعلم والتدريس |                                                            |                                  |
|-----------------------------------------------------------------|------------------------------------------------------------|----------------------------------|
|                                                                 | <b>Text</b>                                                | <b>Available in the Library?</b> |
| <b>Required Texts</b>                                           | Research Methodology by Ashish Kumar Sharma (2020)         | Yes                              |
| <b>Recommended Texts</b>                                        | Scientific Research Methodology by Alejandro Drewes (2021) | Yes                              |

|          |  |
|----------|--|
| Websites |  |
|----------|--|

| GRADING SCHEME                                                                                                                                                                                                                                                                                                                                                       |                  |             |           |                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|-----------|---------------------------------------|
| مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                         |                  |             |           |                                       |
| Group                                                                                                                                                                                                                                                                                                                                                                | Grade            | التقدير     | Marks (%) | Definition                            |
| Success Group<br>(50 - 100)                                                                                                                                                                                                                                                                                                                                          | A - Excellent    | امتياز      | 90 - 100  | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                      | B - Very Good    | جيد جدا     | 80 - 89   | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                      | C - Good         | جيد         | 70 - 79   | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                      | D - Satisfactory | متوسط       | 60 - 69   | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                      | E - Sufficient   | مقبول       | 50 - 59   | Work meets minimum criteria           |
| Fail Group<br>(0 – 49)                                                                                                                                                                                                                                                                                                                                               | FX – Fail        | مقبول بقرار | (45-49)   | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                      | F – Fail         | راسب        | (0-44)    | Considerable amount of work required  |
|                                                                                                                                                                                                                                                                                                                                                                      |                  |             |           |                                       |
| Note:                                                                                                                                                                                                                                                                                                                                                                |                  |             |           |                                       |
| NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |                  |             |           |                                       |

(المرحلة الثانية/الفصل الاول)

## MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

|                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                             |                                                                                                                                                                                                                                                     |                                     |
|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <b>Module Title</b>                                                                                                                  | <b>Sustainable Energy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                             | <b>Module Delivery</b>                                                                                                                                                                                                                              |                                     |
| <b>Module Type</b>                                                                                                                   | <b>C</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                             | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                                     |
| <b>Module Code</b>                                                                                                                   | <b>RSGIS23009</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                             |                                                                                                                                                                                                                                                     |                                     |
| <b>ECTS Credits</b>                                                                                                                  | <b>3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                             |                                                                                                                                                                                                                                                     |                                     |
| <b>SWL (hr/sem)</b>                                                                                                                  | <b>75</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                             |                                                                                                                                                                                                                                                     |                                     |
| <b>Module Level</b>                                                                                                                  | <b>UGII</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Semester of Delivery</b> |                                                                                                                                                                                                                                                     |                                     |
| <b>Administering Department</b>                                                                                                      | Type Dept. Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>College</b>              | Type College Code                                                                                                                                                                                                                                   |                                     |
| <b>Module Leader</b>                                                                                                                 | <b>Sundus abd alabass Albakry</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                             | <b>e-mail</b>                                                                                                                                                                                                                                       | sundus.abdullah@sc.uobaghdad.edu.iq |
| <b>Module Leader's Acad. Title</b>                                                                                                   | Professor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                             | <b>Module Leader's Qualification</b>                                                                                                                                                                                                                | Ph.D.                               |
| <b>Module Tutor</b>                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                             | <b>e-mail</b>                                                                                                                                                                                                                                       | E-mail                              |
| <b>Peer Reviewer Name</b>                                                                                                            | Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>e-mail</b>               | E-mail                                                                                                                                                                                                                                              |                                     |
| <b>Scientific Committee Approval Date</b>                                                                                            | 1/10/2025                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Version Number</b>       | 1.0                                                                                                                                                                                                                                                 |                                     |
| <p>Relation with other Modules</p> <p>العلاقة مع المواد الدراسية الأخرى</p>                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                             |                                                                                                                                                                                                                                                     |                                     |
| <b>Prerequisite module</b>                                                                                                           | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                             | <b>Semester</b>                                                                                                                                                                                                                                     |                                     |
| <b>Co-requisites module</b>                                                                                                          | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                             | <b>Semester</b>                                                                                                                                                                                                                                     |                                     |
| <p><b>Module Aims, Learning Outcomes and Indicative Contents</b></p> <p>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                             |                                                                                                                                                                                                                                                     |                                     |
| <b>Module Objectives</b><br>أهداف المادة الدراسية                                                                                    | <p>Here are some potential learning objectives related to sustainable energy:</p> <ol style="list-style-type: none"> <li>1. Define sustainable energy and explain its importance in mitigating climate change and promoting environmental sustainability.</li> <li>2. Identify different sources of sustainable energy, such as solar, wind, hydropower, geothermal, and bioenergy, and describe their advantages and disadvantages.</li> <li>3. Analyze the economic, social, and environmental impacts of transitioning to sustainable energy systems, including job creation, energy independence, and reduced greenhouse gas emissions.</li> <li>4. Evaluate the technological and policy barriers to scaling up sustainable energy systems and propose strategies for overcoming these barriers.</li> <li>5. Apply principles of energy efficiency to reduce energy consumption and optimize the use of sustainable energy sources.</li> <li>6. Demonstrate knowledge of energy storage technologies, including batteries, pumped hydro storage, and thermal energy storage, and explain their role in enabling the integration of renewable energy into the grid.</li> <li>7. Critically evaluate the role of fossil fuels in the current energy system and propose strategies for phasing out their use in favor of sustainable energy sources.</li> </ol> |                             |                                                                                                                                                                                                                                                     |                                     |

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|                                                                      | <ol style="list-style-type: none"> <li>8. Understand the social and cultural dimensions of sustainable energy transitions, including community engagement, stakeholder involvement, and equitable access to energy resources.</li> <li>9. Analyze case studies of successful sustainable energy projects and apply lessons learned to real-world challenges in the energy sector.</li> <li>10. Develop a comprehensive understanding of sustainable energy policy frameworks, including international agreements, national regulations, and local initiatives, and propose strategies for advancing sustainable energy policy goals.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Module Learning Outcomes</b><br><br>مخرجات التعلم للمادة الدراسية | <p>Here are some possible learning outcomes for a course on sustainable energy:</p> <ol style="list-style-type: none"> <li>1. Understand the principles of sustainable energy, including the environmental, social, and economic benefits and challenges of different sustainable energy options.</li> <li>2. Analyze the feasibility and potential of different sustainable energy technologies, including solar, wind, hydropower, geothermal, and bioenergy, as well as energy storage and policy frameworks.</li> <li>3. Evaluate the role of sustainable energy in mitigating climate change and promoting environmental sustainability, and the potential for sustainable energy to transform the energy system.</li> <li>4. Apply interdisciplinary approaches to sustainable energy problem-solving, including integration of engineering, economics, policy, and social sciences.</li> <li>5. Critically assess the social and cultural dimensions of sustainable energy transitions, including community engagement and stakeholder involvement, and strategies for promoting equitable access to sustainable energy resources.</li> <li>6. Develop and present sustainable energy project proposals, incorporating technical, economic, and policy considerations.</li> <li>7. Evaluate the potential for sustainable energy job creation and entrepreneurship, and develop strategies for promoting sustainable energy job creation and business development.</li> <li>8. Understand the policy and regulatory frameworks for sustainable energy adoption and promotion, and develop strategies for advancing sustainable energy policy goals.</li> <li>9. Analyze the technological, policy, and social barriers to sustainable energy adoption, and develop strategies for overcoming these barriers.</li> <li>10. Understand the role of sustainable energy in national and global energy systems, and evaluate the potential for sustainable energy to promote energy security and international cooperation.</li> </ol> |
| <b>Indicative Contents</b><br><br>المحتويات الإرشادية                | <p>Here are some possible indicative contents for a course on sustainable energy:</p> <ol style="list-style-type: none"> <li>1. Introduction to Sustainable Energy <ul style="list-style-type: none"> <li>- Definition and importance of sustainable energy</li> <li>- Overview of sustainable energy technologies and their impacts on the environment, society, and economy</li> <li>- Historical and current global energy trends and their implications</li> </ul> </li> <li>2. Energy Efficiency <ul style="list-style-type: none"> <li>- Principles of energy efficiency and conservation</li> <li>- Strategies for reducing energy consumption in buildings, transportation, and industry</li> <li>- Case studies of successful energy efficiency initiatives</li> </ul> </li> <li>3. Solar Energy <ul style="list-style-type: none"> <li>- Principles of solar energy conversion</li> </ul> </li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

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|  | <ul style="list-style-type: none"> <li>- Types of solar panels and their efficiency</li> <li>- Applications of solar energy in residential, commercial, and industrial settings</li> <li>- Solar energy policy and regulatory frameworks</li> </ul>                                                                                                                                    |
|  | <p>4. Wind Energy</p> <ul style="list-style-type: none"> <li>- Principles of wind energy conversion</li> <li>- Types of wind turbines and their efficiency</li> <li>- Applications of wind energy in residential, commercial, and industrial settings</li> <li>- Wind energy policy and regulatory frameworks</li> </ul>                                                               |
|  | <p>5. Hydropower</p> <ul style="list-style-type: none"> <li>- Principles of hydropower generation</li> <li>- Types of hydropower systems and their efficiency</li> <li>- Advantages and disadvantages of hydropower</li> <li>- Hydropower policy and regulatory frameworks</li> </ul>                                                                                                  |
|  | <p>6. Geothermal Energy</p> <ul style="list-style-type: none"> <li>- Principles of geothermal energy conversion</li> <li>- Types of geothermal systems and their efficiency</li> <li>- Applications of geothermal energy in residential, commercial, and industrial settings</li> <li>- Geothermal energy policy and regulatory frameworks</li> </ul>                                  |
|  | <p>7. Bioenergy</p> <ul style="list-style-type: none"> <li>- Principles of bioenergy conversion</li> <li>- Types of bioenergy systems and their efficiency</li> <li>- Applications of bioenergy in residential, commercial, and industrial settings</li> <li>- Bioenergy policy and regulatory frameworks</li> </ul>                                                                   |
|  | <p>8. Energy Storage</p> <ul style="list-style-type: none"> <li>- Principles of energy storage</li> <li>- Types of energy storage systems, including batteries, pumped hydro storage, and thermal energy storage</li> <li>- Role of energy storage in enabling the integration of renewable energy into the grid</li> <li>- Energy storage policy and regulatory frameworks</li> </ul> |
|  | <p>9. Fossil Fuels</p> <ul style="list-style-type: none"> <li>- Overview of the role of fossil fuels in the current energy system</li> <li>- Environmental and social impacts of fossil fuel use</li> <li>- Strategies for phasing out fossil fuels in favor of sustainable energy sources</li> <li>- Fossil fuel policy and regulatory frameworks</li> </ul>                          |
|  | <p>10. Sustainable Energy Policy</p> <ul style="list-style-type: none"> <li>- Overview of international and national sustainable energy policy frameworks</li> <li>- Case studies of successful sustainable energy policy initiatives</li> <li>- Strategies for advancing sustainable energy policy goals</li> <li>- Sustainable energy policy and regulatory frameworks</li> </ul>    |
|  | <p>11. Technological Barriers to Sustainable Energy Adoption</p> <ul style="list-style-type: none"> <li>- Overview of technological barriers to scaling up sustainable energy systems</li> <li>- Case studies of successful technological innovations in sustainable energy</li> <li>- Strategies for overcoming technological barriers to sustainable energy adoption</li> </ul>      |
|  | <p>12. Policy Barriers to Sustainable Energy Adoption</p> <ul style="list-style-type: none"> <li>- Overview of policy barriers to scaling up sustainable energy systems</li> <li>- Case studies of successful policy initiatives in sustainable energy</li> <li>- Strategies for overcoming policy barriers to sustainable energy adoption</li> </ul>                                  |

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|  | <p>13. Social and Cultural Dimensions of Sustainable Energy Transitions</p> <ul style="list-style-type: none"> <li>- Overview of community engagement and stakeholder involvement in sustainable energy transitions</li> <li>- Case studies of successful community-based sustainable energy projects</li> <li>- Strategies for promoting equitable access to sustainable energy resources</li> </ul> <p>14. Sustainable Energy Job Creation and Entrepreneurship</p> <ul style="list-style-type: none"> <li>- Overview of job creation and entrepreneurship in the sustainable energy sector</li> <li>- Case studies of successful sustainable energy job creation and entrepreneurship initiatives</li> <li>- Strategies for promoting sustainable energy job creation and entrepreneurship</li> </ul> <p>15. Sustainable Energy Project Presentations and Group Work</p> <ul style="list-style-type: none"> <li>- Students work in groups to develop and present sustainable energy project proposals, incorporating technical, economic, and policy considerations</li> <li>- Peer review and feedback on project proposals</li> </ul> <p>16. Course Review and Future Directions</p> <ul style="list-style-type: none"> <li>- Review of course content and learning outcomes</li> <li>- Discussion of potential future directions in sustainable energy research, policy, and practice.</li> </ul> |
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### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| Strategies | <p>Here are some potential learning and teaching strategies for sustainable energy:</p> <ol style="list-style-type: none"> <li>1. Use case studies and real-world examples to illustrate the economic, social, and environmental impacts of sustainable energy systems. This can help students understand the practical implications of sustainable energy and motivate them to pursue careers in the field.</li> <li>2. Incorporate hands-on activities and experiments to help students understand the principles of energy efficiency, renewable energy, and energy storage. For example, students could build their own solar panels or wind turbines and test their performance under different conditions.</li> <li>3. Use multimedia resources, such as videos, interactive simulations, and web-based tools, to help students visualize complex concepts and understand how sustainable energy systems work.</li> <li>4. Encourage collaboration and teamwork by assigning group projects that require students to work together to design and implement sustainable energy solutions. This can help students develop their communication and problem-solving skills while also fostering a sense of community and shared purpose.</li> <li>5. Invite guest speakers from the sustainable energy industry to share their insights and experiences with students. This can provide students with valuable networking opportunities and help them understand the practical challenges and opportunities in the field.</li> <li>6. Use inquiry-based learning strategies to help students develop critical thinking skills and engage with complex sustainability challenges. For example, students could be asked to investigate the environmental impacts of a particular energy source, or to propose ways to overcome technological or policy barriers to sustainable energy adoption.</li> <li>7. Incorporate field trips to sustainable energy facilities, such as wind farms, solar power plants, or hydropower installations. This can help students understand how</li> </ol> |
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|  | <p>sustainable energy systems operate in the real world and provide inspiration for their own sustainable energy projects.</p> <p>8. Use formative assessments, such as quizzes, group discussions, and short writing assignments, to gauge student understanding and provide feedback on their progress. This can help students stay engaged and motivated while also providing instructors with valuable insights into areas where students may need additional support.</p> <p>9. Foster a culture of sustainability in the classroom by modeling sustainable behaviors, such as using energy-efficient lighting and equipment, reducing waste, and encouraging sustainable transportation options. This can help students understand the importance of sustainable practices in their daily lives and inspire them to make positive changes in their communities.</p> <p>10. Encourage students to engage with sustainable energy issues beyond the classroom by participating in extracurricular activities, such as sustainability clubs, internships, or volunteer opportunities. This can help students develop their leadership skills and build their resumes while also contributing to the broader sustainability movement.</p> |
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### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |  |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |     | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |     | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |  |

### Module Evaluation

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

|               | Material Covered                                                                                                                                                                                                                                                                                                                              |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b> | <p>Introduction to Sustainable Energy</p> <ul style="list-style-type: none"> <li>- Definition and importance of sustainable energy</li> <li>- Overview of sustainable energy technologies and their impacts on the environment, society, and economy</li> <li>- Historical and current global energy trends and their implications</li> </ul> |
| <b>Week 2</b> | <p>Energy Efficiency</p> <ul style="list-style-type: none"> <li>- Principles of energy efficiency and conservation</li> </ul>                                                                                                                                                                                                                 |

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|                | <ul style="list-style-type: none"> <li>- Strategies for reducing energy consumption in buildings, transportation, and industry</li> <li>- Case studies of successful energy efficiency initiatives</li> </ul>                                                                                                                                                                       |
| <b>Week 3</b>  | <p>Solar Energy</p> <ul style="list-style-type: none"> <li>- Principles of solar energy conversion</li> <li>- Types of solar panels and their efficiency</li> <li>- Applications of solar energy in residential, commercial, and industrial settings</li> <li>- Solar energy policy and regulatory frameworks</li> </ul>                                                            |
| <b>Week 4</b>  | <p>Wind Energy</p> <ul style="list-style-type: none"> <li>- Principles of wind energy conversion</li> <li>- Types of wind turbines and their efficiency</li> <li>- Applications of wind energy in residential, commercial, and industrial settings</li> <li>- Wind energy policy and regulatory frameworks</li> </ul>                                                               |
| <b>Week 5</b>  | <p>Hydropower</p> <ul style="list-style-type: none"> <li>- Principles of hydropower generation</li> <li>- Types of hydropower systems and their efficiency</li> <li>- Advantages and disadvantages of hydropower</li> <li>- Hydropower policy and regulatory frameworks</li> </ul>                                                                                                  |
| <b>Week 6</b>  | <p>Geothermal Energy</p> <ul style="list-style-type: none"> <li>- Principles of geothermal energy conversion</li> <li>- Types of geothermal systems and their efficiency</li> <li>- Applications of geothermal energy in residential, commercial, and industrial settings</li> <li>- Geothermal energy policy and regulatory frameworks</li> </ul>                                  |
| <b>Week 7</b>  | <p>Bioenergy</p> <ul style="list-style-type: none"> <li>- Principles of bioenergy conversion</li> <li>- Types of bioenergy systems and their efficiency</li> <li>- Applications of bioenergy in residential, commercial, and industrial settings</li> <li>- Bioenergy policy and regulatory frameworks</li> </ul>                                                                   |
| <b>Week 8</b>  | <p>Energy Storage</p> <ul style="list-style-type: none"> <li>- Principles of energy storage</li> <li>- Types of energy storage systems, including batteries, pumped hydro storage, and thermal energy storage</li> <li>- Role of energy storage in enabling the integration of renewable energy into the grid</li> <li>- Energy storage policy and regulatory frameworks</li> </ul> |
| <b>Week 9</b>  | <p>Fossil Fuels</p> <ul style="list-style-type: none"> <li>- Overview of the role of fossil fuels in the current energy system</li> <li>- Environmental and social impacts of fossil fuel use</li> <li>- Strategies for phasing out fossil fuels in favor of sustainable energy sources</li> <li>- Fossil fuel policy and regulatory frameworks</li> </ul>                          |
| <b>Week 10</b> | <p>Sustainable Energy Policy</p> <ul style="list-style-type: none"> <li>- Overview of international and national sustainable energy policy frameworks</li> <li>- Case studies of successful sustainable energy policy initiatives</li> <li>- Strategies for advancing sustainable energy policy goals</li> <li>- Sustainable energy policy and regulatory frameworks</li> </ul>     |
| <b>Week 11</b> | <p>Technological Barriers to Sustainable Energy Adoption</p> <ul style="list-style-type: none"> <li>- Overview of technological barriers to scaling up sustainable energy systems</li> <li>- Case studies of successful technological innovations in sustainable energy</li> <li>- Strategies for overcoming technological barriers to sustainable energy adoption</li> </ul>       |
| <b>Week 12</b> | <p>Policy Barriers to Sustainable Energy Adoption</p> <ul style="list-style-type: none"> <li>- Overview of policy barriers to scaling up sustainable energy systems</li> <li>- Case studies of successful policy initiatives in sustainable energy</li> <li>- Strategies for overcoming policy barriers to sustainable energy adoption</li> </ul>                                   |
| <b>Week 13</b> | <p>Social and Cultural Dimensions of Sustainable Energy Transitions</p> <ul style="list-style-type: none"> <li>- Overview of community engagement and stakeholder involvement in sustainable energy transitions</li> <li>- Case studies of successful community-based sustainable energy projects</li> </ul>                                                                        |

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|                | - Strategies for promoting equitable access to sustainable energy resources                                                                                                                                                                                                                                                  |
| <b>Week 14</b> | Sustainable Energy Job Creation and Entrepreneurship<br>- Overview of job creation and entrepreneurship in the sustainable energy sector<br>- Case studies of successful sustainable energy job creation and entrepreneurship initiatives<br>- Strategies for promoting sustainable energy job creation and entrepreneurship |
| <b>Week 15</b> | Sustainable Energy Project Presentations and Group Work<br>- Students work in groups to develop and present sustainable energy project proposals, incorporating technical, economic, and policy considerations<br>- Peer review and feedback on project proposals                                                            |
| <b>Week 16</b> | Course Review and Future Directions<br>- Review of course content and learning outcomes<br>- Discussion of potential future directions in sustainable energy research, policy, and practice.                                                                                                                                 |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                       | Text                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Available in the Library? |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b> | <p>Here are some potential required texts for a course on sustainable energy:</p> <ol style="list-style-type: none"> <li>1. Renewable and Efficient Electric Power Systems, by Gilbert M. Masters and Wendell H. Shepard. This textbook provides a comprehensive overview of renewable energy sources and their integration into the electric power grid, with a focus on energy efficiency and sustainability.</li> <li>2. Sustainable Energy: Choosing Among Options, by Jefferson W. Tester, Elisabeth M. Drake, Michael J. Driscoll, and Michael W. Golay. This textbook provides a balanced and comprehensive analysis of different sustainable energy options, including solar, wind, hydropower, geothermal, and bioenergy, as well as energy storage and policy frameworks.</li> <li>3. Energy for Sustainability: Technology, Planning, Policy, by John Randolph and Gilbert M. Masters. This textbook provides a comprehensive overview of sustainable energy technologies, planning frameworks, and policy initiatives, with a focus on interdisciplinary approaches and practical applications.</li> <li>4. Introduction to Renewable Energy, by Vaughn C. Nelson. This textbook provides an introduction to renewable energy technologies, including solar, wind, hydropower, geothermal, and bioenergy, as well as energy storage and policy frameworks.</li> <li>5. Sustainable Energy Systems Engineering: The Complete Green Building Design Resource, by Peter Gevorkian. This textbook provides a practical guide to designing and implementing sustainable energy systems, including solar, wind, hydropower, geothermal, and bioenergy, as well as energy storage and policy frameworks.</li> </ol> | No                        |

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| <p style="text-align: center;"><b>Recommended Texts</b></p> | <p>Here are some potential recommended texts for a course on sustainable energy:</p> <ol style="list-style-type: none"> <li>1. Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming, edited by Paul Hawken. This book provides a comprehensive overview of the top 100 solutions to global warming, including sustainable energy solutions such as solar, wind, and geothermal energy.</li> <li>2. The New Grand Strategy: Restoring America's Prosperity, Security, and Sustainability in the 21st Century, by Mark Mykleby, Patrick Doherty, and Joel Makower. This book provides a vision for a sustainable and prosperous future, with a focus on sustainable energy and a new national security strategy.</li> <li>3. Reinventing Fire: Bold Business Solutions for the New Energy Era, by Amory Lovins. This book provides a comprehensive plan for transitioning to a sustainable energy future, with a focus on energy efficiency and renewable energy technologies.</li> <li>4. Energy Transitions: History, Requirements, Prospects, by Vaclav Smil. This book provides a historical perspective on energy transitions and the challenges and opportunities of transitioning to a sustainable energy system, with a focus on energy efficiency and renewable energy technologies.</li> <li>5. Energy for Future Presidents: The Science Behind the Headlines, by Richard A. Muller. This book provides an overview of the science and technology behind sustainable energy solutions, as well as the economic, social, and environmental factors that influence their adoption.</li> </ol> | <p>No</p> |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Websites | <ol style="list-style-type: none"> <li>1. National Renewable Energy Laboratory (NREL) - <a href="https://www.nrel.gov/">https://www.nrel.gov/</a><br/>NREL is a leading research center focused on renewable energy and energy efficiency. Their website provides information on research, technology development, and policy analysis related to solar, wind, hydropower, geothermal, and bioenergy.</li> <li>2. International Energy Agency (IEA) - <a href="https://www.iea.org/">https://www.iea.org/</a><br/>The IEA is an intergovernmental organization focused on promoting sustainable energy policies and technologies. Their website provides analysis and data on global energy trends, as well as reports and publications related to sustainable energy.</li> <li>3. Clean Energy Ministerial (CEM) - <a href="https://www.cleanenergyministerial.org/">https://www.cleanenergyministerial.org/</a><br/>CEM is a global forum of energy ministers focused on advancing clean energy policies and technologies. Their website provides information on initiatives and programs related to sustainable energy, as well as case studies and best practices from around the world.</li> <li>4. Rocky Mountain Institute (RMI) - <a href="https://rmi.org/">https://rmi.org/</a><br/>RMI is a nonprofit organization focused on accelerating the transition to a sustainable energy future. Their website provides information on research, consulting services, and policy analysis related to energy efficiency, renewable energy, and sustainable transportation.</li> <li>5. Energy.gov - <a href="https://www.energy.gov/">https://www.energy.gov/</a><br/>Energy.gov is the official website of the U.S. Department of Energy, providing information on programs and initiatives related to sustainable energy, including research, development, and deployment of renewable energy technologies.</li> <li>6. Solar Energy Industries Association (SEIA) - <a href="https://www.seia.org/">https://www.seia.org/</a><br/>SEIA is a trade association representing the solar energy industry in the United States. Their website provides information on policy and regulatory issues, market trends, and research related to solar energy.</li> <li>7. American Wind Energy Association (AWEA) - <a href="https://www.awea.org/">https://www.awea.org/</a><br/>AWEA is a trade association representing the wind energy industry in the United States. Their website provides information on policy and regulatory issues, market trends, and research related to wind energy.</li> <li>8. The International Renewable Energy Agency (IRENA) - <a href="https://www.irena.org/">https://www.irena.org/</a><br/>IRENA is an intergovernmental organization focused on promoting the adoption of renewable energy technologies worldwide. Their website provides analysis and data on global renewable energy trends, as well as reports and publications related to renewable energy.</li> </ol> |
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| Grading Scheme<br>مخطط الدرجات |                  |                     |          |                                       |
|--------------------------------|------------------|---------------------|----------|---------------------------------------|
| Group                          | Grade            | التقدير             | Marks %  | Definition                            |
| Success Group<br>(50 - 100)    | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)         | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                |                  |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

### Module Information

معلومات المادة الدراسية

|                                                                  |                    |                 |                               |                                                                                                                                                                                                                                                     |       |
|------------------------------------------------------------------|--------------------|-----------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Module Title                                                     | Geodesy            |                 |                               | Module Delivery                                                                                                                                                                                                                                     |       |
| Module Type                                                      | C                  |                 |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |       |
| Module Code                                                      | RSGIS23110         |                 |                               |                                                                                                                                                                                                                                                     |       |
| ECTS Credits                                                     | 5                  |                 |                               |                                                                                                                                                                                                                                                     |       |
| SWL (hr/sem)                                                     | 125                |                 |                               |                                                                                                                                                                                                                                                     |       |
| Module Level                                                     |                    | UGII            | Semester of Delivery          |                                                                                                                                                                                                                                                     | 3     |
| Administering Department                                         |                    | Type Dept. Code | College                       | Type College Code                                                                                                                                                                                                                                   |       |
| Module Leader                                                    | احلام علي حسين     |                 | e-mail                        | <a href="mailto:ahlam.ali@sc.uobaghdad.edu.iq">ahlam.ali@sc.uobaghdad.edu.iq</a>                                                                                                                                                                    |       |
| Module Leader's Acad. Title                                      |                    | مدرس            | Module Leader's Qualification |                                                                                                                                                                                                                                                     | Ph.D. |
| Module Tutor                                                     | هدى وجود عبدالودود |                 | e-mail                        | M.Sc                                                                                                                                                                                                                                                |       |
| Peer Reviewer Name                                               |                    | Name            | e-mail                        | E-mail                                                                                                                                                                                                                                              |       |
| Scientific Committee Approval Date                               |                    | 1/10/2025       | Version Number                |                                                                                                                                                                                                                                                     | 1.0   |
| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى |                    |                 |                               |                                                                                                                                                                                                                                                     |       |
| Prerequisite module                                              | None               |                 |                               | Semester                                                                                                                                                                                                                                            | Three |
| Co-requisites module                                             | None               |                 |                               | Semester                                                                                                                                                                                                                                            |       |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية | <ol style="list-style-type: none"> <li>1. Understand the fundamental concepts and principles of geodesy, including the Earth's shape, size, and gravity field, and the reference systems used to describe them.</li> <li>2. Develop an understanding of the techniques and methods used in geodetic measurements, including terrestrial, airborne, and space-based techniques.</li> <li>3. Become familiar with the geodetic datum systems used to describe the Earth's surface, including the International Terrestrial Reference Frame (ITRF), the World Geodetic System (WGS), and local datum systems.</li> <li>4. Develop proficiency in geodetic data analysis and interpretation, including error analysis, data quality assessment, and geodetic modeling.</li> </ol> |
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|                                                                             | <p>5. Understand the applications of geodesy in various fields, including navigation, surveying, mapping, geophysics, and Earth sciences.</p> <p>6. Gain familiarity with geodetic software and tools used in data acquisition, processing, and analysis, including Geographic Information Systems (GIS), Global Navigation Satellite Systems (GNSS) software, and remote sensing software.</p> <p>7. Develop critical thinking and problem-solving skills in applying geodetic principles and techniques to real-world problems.</p> <p>8. Gain an awareness of the ethical, social, and legal implications of geodetic data collection and analysis, including issues related to privacy, security, and data sharing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p> | <p>1. Demonstrate an understanding of the fundamental concepts and principles of geodesy, including the Earth's shape, size, and gravity field, and the reference systems used to describe them.</p> <p>2. Apply the techniques and methods used in geodetic measurements, including terrestrial, airborne, and space-based techniques.</p> <p>3. Analyze and interpret geodetic data using appropriate tools and techniques, including error analysis, data quality assessment, and geodetic modeling.</p> <p>4. Evaluate and compare the different geodetic datum systems used to describe the Earth's surface, including the International Terrestrial Reference Frame (ITRF), the World Geodetic System (WGS), and local datum systems.</p> <p>5. Apply geodetic principles and techniques to real-world problems in various fields, including navigation, surveying, mapping, geophysics, and Earth sciences.</p> <p>6. Use geodetic software and tools effectively to acquire, process, and analyze geodetic data.</p> <p>7. Demonstrate critical thinking and problem-solving skills in applying geodetic principles and techniques to real-world problems.</p> <p>8. Evaluate the ethical, social, and legal implications of geodetic data collection and analysis, including issues related to privacy, security, and data sharing.</p> <p>9. Communicate effectively, both orally and in writing, about geodetic concepts, methods, and results to diverse audiences.</p> <p>10. Demonstrate an appreciation for the importance of geodesy in various fields and its impact on society.</p>                                                                                                                                                                                                                                                                        |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>                | <p>1. Introduction to Geodesy: Overview of geodesy, history of geodesy, and the role of geodesy in various fields. The Earth's shape and size, and the reference systems used to describe them.</p> <p>2. Geodetic Measurements: Techniques and methods used in geodetic measurements, including terrestrial, airborne, and space-based techniques. Geodetic instruments and sensors, including global navigation satellite systems (GNSS), gravimeters, and remote sensing.</p> <p>3. Geodetic Datum Systems: Overview of geodetic datum systems used to describe the Earth's surface, including the International Terrestrial Reference Frame (ITRF), the World Geodetic System (WGS), and local datum systems. Transformation between datum systems.</p> <p>4. Geodetic Data Analysis: Error analysis and data quality assessment in geodetic measurements. Geodetic modeling and parameter estimation. Analysis of time-series data.</p> <p>5. Geodetic Applications: Overview of geodetic applications in various fields, including navigation, surveying, mapping, geophysics, and Earth sciences. Case studies and examples of geodetic applications.</p> <p>6. Geodetic Software and Tools: Overview of geodetic software and tools used in data acquisition, processing, and analysis. Geographic Information Systems (GIS), GNSS software, and remote sensing software.</p> <p>7. Geodetic Ethics and Social Implications: Ethical, social, and legal implications of geodetic data collection and analysis, including issues related to privacy, security, and data sharing. The role of geodesy in sustainable development and global governance.</p> <p>8. Future Directions in Geodesy: Emerging trends and future directions in geodesy, including new technologies, data sources, and applications. The role of geodesy in addressing global challenges.</p> |
| <p><b>Learning and Teaching Strategies</b></p>                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <b>Strategies</b> | <ol style="list-style-type: none"> <li>1. Lectures: Lectures can be used to introduce students to theoretical concepts and principles in geodesy. Lectures can also be used to provide an overview of geodetic techniques, methods, and applications.</li> <li>2. Case Studies: Case studies can be used to illustrate the practical applications of geodesy in various fields. Case studies can also be used to highlight the challenges and limitations of geodetic measurements and modeling.</li> <li>3. Laboratory Exercises: Laboratory exercises can be used to provide students with hands-on experience in using geodetic instruments, sensors, and software. Laboratory exercises can also be used to reinforce theoretical concepts and principles.</li> <li>4. Data Analysis Projects: Data analysis projects can be used to provide students with experience in data acquisition, processing, and analysis using geodetic software and tools. Data analysis projects can also be used to develop critical thinking and problem-solving skills.</li> <li>5. Fieldwork: Fieldwork can be used to provide students with experience in conducting geodetic measurements and surveys in real-world settings. Fieldwork can also be used to provide students with an appreciation for the challenges and limitations of geodetic measurements in the field.</li> <li>6. Guest Speakers: Guest speakers can be used to provide students with an opportunity to learn from experts in the field of geodesy. Guest speakers can also be used to provide students with an awareness of the practical applications of geodesy in various fields.</li> <li>7. Group Projects: Group projects can be used to provide students with an opportunity to work collaboratively on real-world geodetic problems. Group projects can also be used to develop communication and teamwork skills.</li> <li>8. Online Resources: Online resources, such as videos, podcasts, and interactive simulations, can be used to supplement classroom learning and provide students with additional opportunities to learn and practice geodetic concepts and principles.</li> </ol> |
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## Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>200</b> |                                                                           |  |

## Module Evaluation

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

| Week           | Material Covered                                                                                                                                                                             |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | 1- Geodetic Surveying:-<br>1-1 History of surveying<br>2-1 Departments of surveying science<br>3-1 Surveying work<br>4-1 Geodesy<br>5-1 Geodesy and surveying                                |
| <b>Week 2</b>  | 1- Geodetic Surveying:-<br>6-1 History of geodesy<br>7-1 Applications of geodesy<br>6-1 Sections of geodesy                                                                                  |
| <b>Week 3</b>  | 2- Coordinates and calculations on the surface of the Earth:-<br>1-2 The shape of the Earth<br>2-2 Coordinate systems<br>3-2 Geographic or geodetic coordinates<br>4-2 Spherical coordinates |
| <b>Week 4</b>  | 2- Coordinates and calculations on the surface of the Earth:-<br>4-2 Spherical coordinates<br>5-2 Cartesian geodetic coordinates<br>6-2 Converting between coordinates                       |
| <b>Week 5</b>  | 2- Coordinates and calculations on the surface of the Earth:-<br>7-2 Projecting maps<br>8-2 Projected coordinate systems                                                                     |
| <b>Week 6</b>  | 3- Earth geodesy and networks of constants:-<br>1-3 Types of geostationary networks<br>2-3 Horizontal geostationary networks (triangle networks)<br>1-2-3 degree grids of triangles          |
| <b>Week 7</b>  | 3- Earth geodesy and networks of constants:-<br>2-2-3 Steps to create triangle networks<br>3-2-3 Robustness of triangle networks                                                             |
| <b>Week 8</b>  | Midterm Exam                                                                                                                                                                                 |
| <b>Week 9</b>  | 3- Earth geodesy and networks of constants:-<br>4-2-3 Obstacles in monitoring triangle networks<br>5-2-3 Conditions in triangle networks<br>6-2-3 Conditions for adjusting triangle networks |
| <b>Week 10</b> | 3- Earth geodesy and networks of constants:-<br>3-3 Vertical geostationary networks (Robert networks)                                                                                        |
| <b>Week 11</b> | 4- Setting geodetic networks:-<br>1-5 Sources and types of errors<br>2-4 General statistical principles<br>3-4 The principle of weight in cadastral measurements                             |
| <b>Week 12</b> | 4- Setting geodetic networks:-<br>4-4 Network settings<br>5-4 Adjusting by the sum of least squares is<br>1-5-4 Adjusting the least squares for observational equations                      |
| <b>Week 13</b> | 4- Setting geodetic networks:-<br>2-5-4 Adjusting least squares for nonlinear equations<br>3-5-4 Setting the least squares for condition equations                                           |
| <b>Week 14</b> | 5- Advanced Geodetic Surveying:-                                                                                                                                                             |

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|                                                                        | 1-5- Geodesic frame of reference                                                                                                                                                                                                                    |
| <b>Week 15</b>                                                         | 5- Advanced Geodetic Surveying:-<br>2-5- Physical Geodetic                                                                                                                                                                                          |
| <b>Week 16</b>                                                         | Preparatory week before the final Exam                                                                                                                                                                                                              |
| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي العملي |                                                                                                                                                                                                                                                     |
|                                                                        | <b>Material Covered</b>                                                                                                                                                                                                                             |
| <b>Week 1</b>                                                          | <b>1- Introduction to Geodetic surveying</b> <ul style="list-style-type: none"> <li>• Geodetic surveying sections</li> </ul>                                                                                                                        |
| <b>Week 2</b>                                                          | <b>2- Coordinate Systems</b> <ul style="list-style-type: none"> <li>• Organize coordinates</li> <li>• Types of coordinate systems</li> <li>• Set of spatial coordinates</li> </ul>                                                                  |
| <b>Week 3</b>                                                          | <b>2- Coordinate Systems</b> <ul style="list-style-type: none"> <li>• A set of geographic coordinates</li> <li>• Plane coordinate system.</li> </ul>                                                                                                |
| <b>Week 4</b>                                                          | <b>2- Coordinate Systems</b> <ul style="list-style-type: none"> <li>• The relationship between spatial and geographic coordinates</li> <li>• Calculating the length and deviation of a side given its plane coordinates</li> </ul>                  |
| <b>Week 5</b>                                                          | <b>3- Triangle Networks and Geodesic Budget</b> <ul style="list-style-type: none"> <li>• Degrees of triangle networks</li> <li>• A comparison table between the degrees of triangle networks.</li> </ul>                                            |
| <b>Week 6</b>                                                          | <b>3- Triangle Networks and Geodesic Budget</b> <ul style="list-style-type: none"> <li>• Types of networks</li> <li>• Where is the milk?</li> <li>• Geodetic budget and its types</li> </ul>                                                        |
| <b>Week 7</b>                                                          | <b>3- Triangle Networks and Geodesic Budget</b> <ul style="list-style-type: none"> <li>• Accurate budget.</li> <li>• Budget purposes</li> <li>• Accurate scale</li> <li>• Exact dictionaries</li> <li>• Features of dictionaries:</li> </ul>        |
| <b>Week 8</b>                                                          | Midterm Exam                                                                                                                                                                                                                                        |
| <b>Week 9</b>                                                          | <b>3- Triangle Networks and Geodesic Budget</b> <ul style="list-style-type: none"> <li>• Precautions to be taken into account: Make an accurate budget</li> <li>• Necessary corrections to meteorology 2 mesa</li> <li>• Triangle budget</li> </ul> |
| <b>Week 10</b>                                                         | <b>4- Constructing a triangle network</b> <ul style="list-style-type: none"> <li>• Exploration and pinpointing</li> <li>• Conditions for choosing a base line</li> <li>• Identify the device used for monitoring</li> </ul>                         |
| <b>Week 11</b>                                                         | <b>4- Constructing a triangle network</b> <ul style="list-style-type: none"> <li>• Types of total station devices</li> <li>• Total Station Device (Power Set 2010)</li> <li>• The main parts of the device</li> </ul>                               |
| <b>Week 12</b>                                                         | <b>4- Constructing a triangle network</b>                                                                                                                                                                                                           |

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|                                                                 | <ul style="list-style-type: none"><li>• Device care</li><li>• How to use the device</li><li>• General sketch of the selected network:</li><li>• Meteorological errors and overcoming them</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                   |
| Week 13                                                         | 5- <b>Monitoring and correcting the triangle grid</b> <ul style="list-style-type: none"><li>• Observations of horizontal and vertical angles</li><li>• Meteorological table for angles</li><li>• Table of vertical angle observations</li><li>• Base line measurement</li><li>• Corrections to the measured distance to the base line</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                   |
| Week 14                                                         | 5- <b>Monitoring and correcting the triangle grid</b> <ul style="list-style-type: none"><li>• Adjusting the grid (calculating average horizontal angle observations)</li><li>• Correcting network shapes</li><li>• Explain how to solve a quadrilateral with two diagonals observed by the approximate method</li><li>• Table No. (1) to adjust the quadrilateral shape with the observed diagonals</li><li>• Explain how to solve a quadrilateral with a center</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                  |                                   |
| Week 15                                                         | 5- <b>Monitoring and correcting the triangle grid</b> <ul style="list-style-type: none"><li>• Solution table for the concentric figure</li><li>• Final corrected angles of the mesh</li><li>• Calculate the side lengths of the network</li><li>• Calculating the deviations of the mesh sides</li><li>• Calculate the levels of grid points using the triangular budget</li><li>• Drawing a network of triangles using a real-time computer (AutoCAD program)</li><li>• The final general shape of the triangle network</li></ul>                                                                                                                                                                                                                                                                                                                                          |                                   |
| Week 16                                                         | Preparatory week before the final Exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                   |
| <b>Learning and Teaching Resources</b><br>مصادر التعلم والتدريس |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                   |
|                                                                 | <b>Text</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Available in the Library ?</b> |
| Required Texts                                                  | <ol style="list-style-type: none"><li>1. "Geodesy" by Wolfgang Torge: This book provides a comprehensive overview of geodesy, including topics such as the Earth's gravity field, geodetic datums, and geodetic measurements. It is suitable for both undergraduate and graduate students.</li><li>2. "Physical Geodesy" by Bernhard Hofmann-Wellenhof, Helmut Moritz, and Martin Langer: This book provides a detailed treatment of physical geodesy and its applications, including topics such as satellite geodesy, geoid determination, and Earth rotation. It is suitable for graduate students and researchers.</li><li>3. "Geodetic Reference Frames: IAG Symposium Munich, Germany, 9-14 October 2006" edited by Markus Rothacher, Thomas Beutler, and Christian Rizos: This book provides an overview of the International Association of Geodesy (IAG)</li></ol> | No                                |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Recommended Texts | <ol style="list-style-type: none"> <li>1. "Introduction to Geodesy: The History and Concepts of Modern Geodesy" by James R. Smith: This book provides an introduction to the history and concepts of modern geodesy, including topics such as geodetic datums, reference frames, and satellite geodesy.</li> <li>2. "Geodetic Deformation Monitoring: From Geophysical to Engineering Roles" by Nico Sneeuw and Chris Rizos: This book provides a comprehensive treatment of geodetic deformation monitoring, including topics such as geodetic networks, data analysis, and interpretation of results.</li> <li>3. "Geodesy: The Concepts" by Petr Vaniček and Edward J. Krakiwsky: This book provides an in-depth treatment of geodetic concepts and principles, including topics such as geodetic coordinates, Earth's gravity field, and geopotential theory.</li> </ol> | No |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Websites | <ul style="list-style-type: none"> <li>• NOAA's National Geodetic Survey (NGS) - <a href="https://www.ngs.noaa.gov/">https://www.ngs.noaa.gov/</a><br/>The NGS is responsible for establishing geodetic control networks in the U.S. and its territories. The website has a lot of information on geodetic datums, coordinate systems, positioning techniques, and GIS data.</li> <li>• National Space-Based Positioning, Navigation, and Timing (PNT) Center of Excellence - <a href="https://spacecenter.gwu.edu/">https://spacecenter.gwu.edu/</a><br/>This center focuses on all aspects of space-based PNT, which includes GNSS topics relevant for geodesy. The website has resources, news, and educational materials.</li> <li>• GEO++ - <a href="http://geopp.unil.ch/">http://geopp.unil.ch/</a><br/>This site provides free educational materials on geodesy and geospatial technologies. It includes slides, videos, and exercises, primarily focused on GNSS geodesy.</li> <li>• European Space Agency (ESA) GNSS website - <a href="https://www.esa.int/Applications/Observing_the_Earth/GNSS">https://www.esa.int/Applications/Observing_the_Earth/GNSS</a><br/>ESA has multiple GNSS satellites and provides information and data useful for geodesy, including precise GPS/GNSS orbit products.</li> </ul> |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Grading Scheme

مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(50 - 100) | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                             | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                             | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                             | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                             | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)      | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                             | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                             |                  |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

### Module Information

معلومات المادة الدراسية

|                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      |                                                                                                                                                                                                                                          |       |
|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Module Title                                                                                                              | <b>Analytical geometry and differential equations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                      | Module Delivery                                                                                                                                                                                                                          |       |
| Module Type                                                                                                               | <b>B</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                      | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |       |
| Module Code                                                                                                               | <b>RSGIS23113</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                                                                                                                                                                                                                                          |       |
| ECTS Credits                                                                                                              | <b>6</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                      |                                                                                                                                                                                                                                          |       |
| SWL (hr/sem)                                                                                                              | <b>150</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |                                                                                                                                                                                                                                          |       |
| Module Level                                                                                                              | <b>UGII</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Semester of Delivery |                                                                                                                                                                                                                                          |       |
| Administering Department                                                                                                  | Type Dept. Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | College              | Type College Code                                                                                                                                                                                                                        |       |
| Module Leader                                                                                                             | فرح علاء عدنان                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      | e-mail                                                                                                                                                                                                                                   |       |
| Module Leader's Acad. Title                                                                                               | مدرس                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                      | Module Leader's Qualification                                                                                                                                                                                                            | Ph.D. |
| Module Tutor                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      | e-mail                                                                                                                                                                                                                                   |       |
| Peer Reviewer Name                                                                                                        | Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | e-mail               | E-mail                                                                                                                                                                                                                                   |       |
| Scientific Committee Approval Date                                                                                        | 1/10/2025                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Version Number       | 1.0                                                                                                                                                                                                                                      |       |
| <b>Relation with other Modules</b><br>العلاقة مع المواد الدراسية الأخرى                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      |                                                                                                                                                                                                                                          |       |
| Prerequisite module                                                                                                       | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                      | Semester                                                                                                                                                                                                                                 |       |
| Co-requisites module                                                                                                      | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                      | Semester                                                                                                                                                                                                                                 |       |
| <b>Module Aims, Learning Outcomes and Indicative Contents</b><br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      |                                                                                                                                                                                                                                          |       |
| <b>Module Objectives</b><br>أهداف المادة الدراسية                                                                         | <p>This course aims to equip students with a comprehensive understanding of analytical geometry and differential equations, equipping them with the necessary skills to solve problems in various fields, including physics, engineering, and economics. The <b>students will be able to:</b></p> <p><b>Analytical Geometry:</b></p> <ul style="list-style-type: none"> <li>Define and understand fundamental concepts in analytical geometry, including points, lines, planes, vectors, curves, and surfaces.</li> <li>Explain the relationship between geometric objects and their algebraic representations.</li> <li>Apply geometric transformations and understand their impact on geometric objects.</li> </ul> <p><b>Problem Solving:</b></p> <ul style="list-style-type: none"> <li>Determine the equation of a line, plane, or curve given specific conditions.</li> <li>Find the distance between points, lines, and planes.</li> <li>Calculate the angle between lines, planes, and vectors.</li> <li>Analyze and solve geometric problems using analytical methods.</li> </ul> <p><b>Applications:</b></p> <ul style="list-style-type: none"> <li>Apply analytical geometry concepts to solve real-world problems in various fields.</li> </ul> |                      |                                                                                                                                                                                                                                          |       |

|                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                             | <ul style="list-style-type: none"> <li>Utilize geometric modeling techniques to represent and analyze complex systems.</li> <li>Understand the role of analytical geometry in computer graphics and other related fields.</li> </ul> <p><b>Differential Equations:</b></p> <ul style="list-style-type: none"> <li>Define and understand different types of differential equations, including ordinary and partial differential equations.</li> <li>Explain the concept of order and degree of a differential equation.</li> <li>Identify the type of differential equation and its appropriate solution method.</li> </ul> <ul style="list-style-type: none"> <li><b>Problem Solving:</b> <ul style="list-style-type: none"> <li>Solve first-order and second-order linear differential equations using various methods, including separation of variables, integrating factors, and variation of parameters.</li> <li>Apply techniques to solve non-linear differential equations.</li> <li>Utilize numerical methods to approximate solutions to differential equations.</li> </ul> </li> <li><b>Applications:</b> <ul style="list-style-type: none"> <li>Apply differential equations to model and solve real-world problems in physics, engineering, biology, and other fields.</li> <li>Understand the role of differential equations in describing phenomena such as population growth, radioactive decay, and heat transfer.</li> <li>Utilize differential equations to analyze and predict the behavior of complex systems.</li> </ul> </li> </ul> |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p> | <ul style="list-style-type: none"> <li>Develop a strong foundation in analytical geometry and differential equations: Students will gain a comprehensive understanding of the fundamental concepts and techniques in both areas.</li> <li>Enhance problem-solving skills and critical thinking abilities: Students will develop the ability to analyze problems, identify appropriate methods, and solve them effectively.</li> <li>Apply theoretical knowledge to real-world problems: Students will be able to translate theoretical concepts into practical applications and solve real-world problems using the tools learned in the course.</li> <li>Gain a deeper understanding of the interconnectedness of mathematics and other disciplines: Students will appreciate the role of analytical geometry and differential equations in various fields and understand their importance in solving real-world problems.</li> </ul> <p>This course will provide students with a solid foundation in analytical geometry and differential equations, enabling them to excel in their future studies and careers.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>                | <p>this course will cover a range of topics in analytical geometry and differential equations, providing a solid foundation for students in various fields. Here is an indicative content outline:</p> <p><b>I. Analytical Geometry</b></p> <p><b>1. Fundamentals of Analytical Geometry</b></p> <ul style="list-style-type: none"> <li>* Coordinate systems: Cartesian, polar, cylindrical, and spherical coordinates.</li> <li>* Distance formula and midpoint formula.</li> <li>* Vectors in two and three dimensions: addition, subtraction, scalar multiplication, dot product, cross product.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

- \* Lines in two and three dimensions: equation of a line, slope-intercept form, point-slope form, parametric equations, vector form.
- \* Planes in three dimensions: equation of a plane, normal vector, distance from a point to a plane.

## **2. Conic Sections**

- \* Circle: equation of a circle, standard form, general form.
- \* Parabola: equation of a parabola, focus, directrix, vertex.
- \* Ellipse: equation of an ellipse, foci, major and minor axes, eccentricity.
- \* Hyperbola: equation of a hyperbola, foci, asymptotes, eccentricity.

## **3. Transformations in Analytical Geometry**

- \* Translations: shifting a geometric object.
- \* Rotations: rotating a geometric object around a point.
- \* Reflections: mirroring a geometric object across a line or plane.
- \* Dilations: scaling a geometric object.

## **4. Applications of Analytical Geometry**

- \* Geometric modeling: representing and analyzing objects using analytical geometry.
- \* Computer graphics: applying analytical geometry to create and manipulate images.
- \* Optimization problems: using analytical geometry to find optimal solutions in various fields.

# **II. Differential Equations**

## **1. Introduction to Differential Equations**

- \* Definition and classification of differential equations: ordinary and partial differential equations, order, degree.
- \* Formation of differential equations from physical problems.
- \* Existence and uniqueness of solutions.

## **2. First-Order Differential Equations**

- \* Separable equations: solving by separation of variables.
- \* Linear equations: solving using integrating factors.
- \* Exact equations: solving using the method of exact differentials.
- \* Applications: modeling population growth, radioactive decay, and other phenomena.

## **3. Second-Order Linear Differential Equations**

- \* Homogeneous equations: finding the general solution using characteristic equations.
- \* Non-homogeneous equations: finding the particular solution using methods like undetermined coefficients and variation of parameters.
- \* Applications: modeling oscillations, vibrations, and other physical systems.

## **4. Numerical Methods for Solving Differential Equations**

- \* Euler's method: approximating solutions using a step-by-step approach.
- \* Runge-Kutta methods: higher-order methods for more accurate approximations.
- \* Applications: solving differential equations when analytical solutions are not available.

## **5. Applications of Differential Equations**

- \* Modeling physical systems: describing the behavior of systems using differential equations.
- \* Engineering applications: solving problems in mechanics, circuits, and other fields.
- \* Biology and economics: modeling population dynamics, economic growth, and other phenomena.

This indicative content outline provides a general overview of the course. The specific topics covered and the depth of coverage may vary depending on the instructor and the specific needs of the students.

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

This course requires a blend of theoretical understanding and practical application. Here are some effective learning and teaching strategies to ensure student success:

#### Learning Strategies:

- **Active Learning:** Encourage active participation through:
  - **Group work:** Students collaborate on problem-solving tasks, fostering discussion and peer learning.
  - **Class discussions:** Engage students in discussions about concepts, applications, and problem-solving strategies.
  - **Interactive exercises:** Utilize online platforms or in-class activities to provide immediate feedback and reinforce learning.
- **Visual Representations:** Utilize visual aids to enhance understanding:
  - **Geometric diagrams:** Draw and analyze geometric objects to visualize concepts and solutions.
  - **Graphs and plots:** Represent functions and solutions of differential equations graphically to gain insights.
  - **Animations and simulations:** Use dynamic visuals to illustrate complex concepts and processes.
- **Real-World Applications:** Connect learning to practical situations:
  - **Case studies:** Analyze real-world problems using analytical geometry and differential equations.
  - **Project-based learning:** Students work on projects that involve applying course concepts to solve real-world challenges.
  - **Guest lectures:** Invite professionals from relevant fields to share their experiences and demonstrate applications.
- **Technology Integration:** Leverage technology to enhance learning:
  - **Online learning platforms:** Utilize platforms for interactive exercises, quizzes, and access to resources.
  - **Mathematical software:** Use software like GeoGebra, Wolfram Alpha, or MATLAB to visualize concepts, solve problems, and explore applications.
  - **Online tutorials and videos:** Provide access to supplementary learning materials for self-paced learning.

#### Teaching Strategies:

- **Clear and Concise Explanations:** Present concepts clearly and concisely, using appropriate language and examples.
- **Problem-Solving Demonstrations:** Show step-by-step solutions to various types of problems, emphasizing key concepts and techniques.
- **Regular Assessments:** Use a variety of assessment methods to monitor student progress:
  - **Homework assignments:** Regular assignments to reinforce concepts and practice problem-solving.
  - **Quizzes:** Short assessments to evaluate understanding of key concepts and problem-solving skills.
  - **Midterm and Final Exams:** Comprehensive assessments to evaluate overall understanding and mastery of the course material.

#### Strategies

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>• <b>Feedback and Support:</b> Provide timely and constructive feedback on student work to identify areas for improvement. Offer individual and group support to address student difficulties and promote learning.</li> <li>• <b>Differentiated Instruction:</b> Cater to diverse learning styles and needs: <ul style="list-style-type: none"> <li>• <b>Multiple learning modalities:</b> Provide materials in various formats (text, audio, video) to cater to different learning preferences.</li> <li>• <b>Flexible pacing:</b> Allow students to work at their own pace and provide additional support as needed.</li> <li>• <b>Collaborative learning groups:</b> Group students with different strengths and weaknesses to promote peer learning and support.</li> </ul> </li> </ul> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |  |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |     | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |     | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |  |

### Module Evaluation

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|                | Material Covered                                                                                                                                                                              |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Introduction to Analytical Geometry: Coordinate Systems, Distance Formula, Midpoint Formula, Vectors in 2D and 3D.                                                                            |
| <b>Week 2</b>  | Vectors, Dot Product, Cross Product: Dot Product, Cross Product, Applications of Vectors.                                                                                                     |
| <b>Week 3</b>  | Lines in 2D and 3D: Equation of a Line, Slope-Intercept Form, Point-Slope Form, Parametric Equations, Vector Form.                                                                            |
| <b>Week 4</b>  | Planes in 3D: Equation of a Plane, Normal Vector, Distance from a Point to a Plane.                                                                                                           |
| <b>Week 5</b>  | Conic Sections: Circle: Circle, Equation of a Circle, Standard Form, General Form.                                                                                                            |
| <b>Week 6</b>  | Conic Sections: Parabola: Equation of a Parabola, Focus, Directrix, Vertex.                                                                                                                   |
| <b>Week 7</b>  | Midterm Exam                                                                                                                                                                                  |
| <b>Week 8</b>  | Conic Sections: Ellipse, Equation of an Ellipse, Foci, Major and Minor Axes, Eccentricity.                                                                                                    |
| <b>Week 9</b>  | Conic Sections: Hyperbola, Equation of a Hyperbola, Foci, Asymptotes, Eccentricity with an applications of Analytical Geometry: Geometric Modeling, Computer Graphics, Optimization Problems. |
| <b>Week 10</b> | Introduction to Differential Equations: Definition and Classification of Differential                                                                                                         |

|                |                                                                                                                                                                      |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | Equations, Order, Degree, Formation of Differential Equations, Existence and Uniqueness of Solutions                                                                 |
| <b>Week 11</b> | First-Order Differential Equations: Separable and Linear: Separable Equations, Linear Equations, Integrating Factors                                                 |
| <b>Week 12</b> | First-Order Differential Equations: Exact Equations and Applications: Exact Equations, Applications of First-Order Differential Equations                            |
| <b>Week 13</b> | Second-Order Linear Differential Equations: Homogeneous: Homogeneous Second-Order Linear Differential Equations, Characteristic Equations                            |
| <b>Week 14</b> | Second-Order Linear Differential Equations: Non-Homogeneous Second-Order Linear Differential Equations, Method of Undetermined Coefficients, Variation of Parameters |
| <b>Week 15</b> | Applications of Differential Equations: Modeling Physical Systems, Engineering Applications, Biology                                                                 |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                                                                                        |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                          | Text                                                                                                                                                                                                                                                                                                                                                        | Available in the Library ? |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <b>Required Texts</b>    | <ol style="list-style-type: none"> <li><b>Calculus: Early Transcendentals</b> by James Stewart</li> <li><b>Calculus: Early Transcendentals</b> by Ron Larson and Bruce Edwards.</li> <li><b>Thomas' Calculus: Early Transcendentals</b> by George B. Thomas, Jr. and Maurice D. Weir.</li> </ol>                                                            | Yes                        |
| <b>Recommended Texts</b> | <ol style="list-style-type: none"> <li><b>Elementary Differential Equations and Boundary Value Problems</b> by William E. Boyce and Richard C. DiPrima.</li> <li><b>Differential Equations with Boundary-Value Problems</b> by Dennis G. Zill and Michael R. Cullen.</li> <li><b>A First Course in Differential Equations</b> by Dennis G. Zill.</li> </ol> | Yes                        |
| <b>Websites</b>          | <ol style="list-style-type: none"> <li>Khan Academy.</li> <li>MIT Open Courseware</li> <li>and Wolfram Alpha</li> </ol>                                                                                                                                                                                                                                     |                            |

### Grading Scheme

مخطط الدرجات

| Group                           | Grade                   | التقدير             | Marks %  | Definition                            |
|---------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group (50 - 100)</b> | <b>A - Excellent</b>    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                 | <b>B - Very Good</b>    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                 | <b>C - Good</b>         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                 | <b>D - Satisfactory</b> | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                 | <b>E - Sufficient</b>   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group (0 - 49)</b>      | <b>FX – Fail</b>        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                 | <b>F – Fail</b>         | راسب                | (0-44)   | Considerable amount of work required  |
|                                 |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

| Module Information                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |                               |                                                                                                                                                                                                                                                     |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |                               |                                                                                                                                                                                                                                                     |
| Module Title                                             | Geographic Information Systems I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      |                               | Module Delivery                                                                                                                                                                                                                                     |
| Module Type                                              | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code                                              | RSGIS23011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                      |                               |                                                                                                                                                                                                                                                     |
| ECTS Credits                                             | 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |                               |                                                                                                                                                                                                                                                     |
| SWL (hr/sem)                                             | 175                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                      |                               |                                                                                                                                                                                                                                                     |
| Module Level                                             | UGII                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Semester of Delivery | 3                             |                                                                                                                                                                                                                                                     |
| Administering Department                                 | Type Dept. Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | College              | Type College Code             |                                                                                                                                                                                                                                                     |
| Module Leader                                            | Ebtesam Fadeal Khanjer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                      | e-mail                        | <a href="mailto:ebtesam.khanjer@sc.uobaghdad.edu.iq">ebtesam.khanjer@sc.uobaghdad.edu.iq</a>                                                                                                                                                        |
| Module Leader's Acad. Title                              | Professor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                      | Module Leader's Qualification | Ph.D.                                                                                                                                                                                                                                               |
| Module Tutor                                             | Reem Shihab Hameed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      | e-mail                        | <a href="mailto:reem.hameed1204@sc.uobaghdad.edu.iq">reem.hameed1204@sc.uobaghdad.edu.iq</a>                                                                                                                                                        |
| Peer Reviewer Name                                       | ا.د. اسراء جميل                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      | e-mail                        |                                                                                                                                                                                                                                                     |
| Scientific Committee Approval Date                       | 1/10/2025                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                      | Version Number                | 1.0                                                                                                                                                                                                                                                 |
| Relation with other Modules                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |                               |                                                                                                                                                                                                                                                     |
| العلاقة مع المواد الدراسية الأخرى                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |                               |                                                                                                                                                                                                                                                     |
| Prerequisite module                                      | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                      |                               | Semester                                                                                                                                                                                                                                            |
| Co-requisites module                                     | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                      |                               | Semester                                                                                                                                                                                                                                            |
| Module Aims, Learning Outcomes and Indicative Contents   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |                               |                                                                                                                                                                                                                                                     |
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |                               |                                                                                                                                                                                                                                                     |
| Module Objectives<br>أهداف المادة الدراسية               | 1. Understanding the basics of GIS: Students should be able to define GIS, understand its applications, and identify the components of a GIS system.<br>2. Understanding spatial data: Students should be able to differentiate between different types of spatial data, such as vector and raster data, and understand how to represent and manipulate spatial data.<br>3. GIS software proficiency: Students should be able to use GIS software, such as ArcGIS or QGIS, to perform basic GIS tasks, such as creating maps, analyzing spatial data, and querying databases.<br>4. Data management: Students should be able to organize, manage, and store spatial data, including creating and managing spatial databases. |                      |                               |                                                                                                                                                                                                                                                     |

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   | <p>5. Coordinate systems and projections: Students should be able to understand the importance of coordinate systems and map projections in GIS, and be able to select and use appropriate coordinate systems and projections for their GIS projects.</p> <p>6. Cartography: Students should be able to create effective maps using GIS software, including selecting appropriate symbology, creating map layouts, and communicating spatial information effectively.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>       | <p>1. Define GIS, identify its components, and explain its applications in various fields.</p> <p>2. Differentiate between vector and raster data, and use GIS software to represent and manipulate spatial data.</p> <p>3. Use GIS software to create maps, analyze spatial data, and query databases.</p> <p>4. Organize, manage, and store spatial data, including creating and managing spatial databases.</p> <p>5. Select and use appropriate coordinate systems and projections for GIS projects.</p> <p>6. Create effective maps using GIS software, including selecting appropriate symbology, creating map layouts, and communicating spatial information effectively.</p> <p>7. Perform basic spatial analysis tasks, such as overlaying and buffering spatial data, and interpret the results of these analyses.</p> <p>8. Identify and explain real-world applications of GIS, such as urban planning, environmental management, and disaster response.</p> <p>9. Apply ethical principles when working with spatial data, including issues related to privacy, data ownership, and data accuracy.</p> <p>10. Effectively communicate and collaborate with others on GIS projects, including presenting GIS analyses and contributing to group projects.</p> <p>11. Evaluate the strengths and limitations of GIS technology and its potential impact on society.</p> <p>12. Demonstrate proficiency in using GIS software and tools through completing GIS projects and assignments.</p> |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>                      | <p>1. Introduction to GIS: Definition of GIS, history of GIS, and explanation of its applications in various fields.</p> <p>2. Spatial Data: Vector and raster data, coordinate systems and projections, data formats, and data sources.</p> <p>3. GIS Software: Overview of popular GIS software, such as ArcGIS or QGIS, and introduction to basic GIS functionalities.</p> <p>4. Data Management: Data input, data organization, data storage, data retrieval, and metadata.</p> <p>5. Cartography: Map design principles, cartographic elements, and map production using GIS software.</p> <p>6. Spatial Analysis: Spatial queries, spatial analysis operations, and spatial statistics.</p> <p>7. Real-world Applications: Examples of GIS applications in various fields, such as urban planning, environmental management, and disaster response.</p> <p>8. Data Ethics: Ethical considerations and principles related to GIS data collection, processing, and dissemination.</p> <p>9. Group Projects: Collaborative projects in which students apply GIS concepts and skills to real-world problems and situations.</p> <p>10. GIS Project Management: Project planning, project design, and project implementation.</p> <p>11. GIS Project Presentation: Presentation of GIS projects using appropriate communication tools.</p>                                                                                                                                                            |
| <p><b>Learning and Teaching Strategies</b></p> <p>استراتيجيات التعلم والتعليم</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>Strategies</b></p>                                                          | <p>1. Lectures: The instructor can deliver lectures to introduce GIS concepts, theories, and applications. Lectures can involve multimedia resources, such as slides, videos, and animations, to enhance learning.</p> <p>2. Hands-on Exercises: Students can work on hands-on exercises to apply GIS concepts and skills using GIS software. Exercises can involve data manipulation, map creation, and spatial analysis.</p> <p>3. Group Projects: Students can work in groups to apply GIS concepts and skills to real-world problems and situations. Group projects can involve data collection, data analysis, and map production.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>4. Case Studies: The instructor can present case studies that illustrate GIS applications in various fields, such as urban planning, environmental management, and disaster response. Case studies can involve guest speakers, field trips, or online resources.</p> <p>5. Discussions: Students can participate in class discussions to exchange ideas, ask questions, and reflect on GIS concepts and applications. Discussions can be guided by prompts or questions and can involve small group or whole class formats.</p> <p>6. Tutorials: The instructor can provide tutorials to help students master GIS software tools and functionalities. Tutorials can involve step-by-step instructions, screenshots, and video demonstrations.</p> <p>7. Assessments: Students can be assessed using a variety of methods, such as quizzes, exams, assignments, and presentations. Assessments can test students' knowledge, skills, and critical thinking abilities.</p> <p>8. Online Resources: The instructor can provide online resources, such as videos, tutorials, blogs, and discussion forums, to support learning outside the classroom.</p> |
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### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>200</b> |                                                                           |  |

### Module Evaluation

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|               | Material Covered                                                                                                                                                                                                       |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b> | <p>Introduction to GIS</p> <ul style="list-style-type: none"> <li>- Definition of GIS</li> <li>- Brief history of GIS</li> <li>- Components of a GIS system</li> <li>- Applications of GIS</li> </ul>                  |
| <b>Week 2</b> | <p>GIS Software</p> <ul style="list-style-type: none"> <li>- Overview of popular GIS software (e.g. ArcGIS or QGIS)</li> <li>- Basic GIS functionalities</li> <li>- File formats and data types used in GIS</li> </ul> |
| <b>Week 3</b> | <p>Spatial Data</p> <ul style="list-style-type: none"> <li>- Vector and raster data</li> <li>- Coordinate systems and projections</li> <li>- Data sources (e.g. GPS, remote sensing)</li> </ul>                        |

|                                                                        |                                                                                                                                                                         |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 4</b>                                                          | Data Management<br>- Data input and editing<br>- Data storage and retrieval<br>- Metadata                                                                               |
| <b>Week 5</b>                                                          | Cartography<br>- Map design principles<br>- Cartographic elements<br>- Map production using GIS software                                                                |
| <b>Week 6</b>                                                          | Why GIS: Advantages of GIS<br>GIS Development                                                                                                                           |
| <b>Week 7</b>                                                          | GIS Application<br>Major Services in GIS                                                                                                                                |
| <b>Week 8</b>                                                          | Exam                                                                                                                                                                    |
| <b>Week 9</b>                                                          | : Accuracy and Error<br>- Sources of error in GIS data<br>- Measures of accuracy<br>- Error propagation                                                                 |
| <b>Week 10</b>                                                         | Geographic coordinate system (GCS)<br>Graticule<br>Spheroids and spheres<br>World Geodetic System<br>Datums                                                             |
| <b>Week 11</b>                                                         | Web GIS<br>- Overview of web GIS<br>- Web mapping and web services<br>- Open data and open source GIS                                                                   |
| <b>Week 12</b>                                                         | projected coordinate systems<br>Conic (tangent) , Projection types<br>A cone is placed over a globe<br>Cylindrical Projection<br>Planar projection                      |
| <b>Week 13</b>                                                         | Final Project Planning<br>- Collaborative project in which students apply GIS concepts and skills to a real-world problem or situation<br>- Project planning and design |
| <b>Week 14</b>                                                         | : Final Project Implementation<br>- Implementation of the final project<br>- Troubleshooting and problem-solving                                                        |
| <b>Week 15</b>                                                         | Final Project Presentation<br>- Presentation of GIS project using appropriate communication tools<br>- Course wrap-up and review                                        |
| <b>Week 16</b>                                                         | Preparatory week before the final Exam                                                                                                                                  |
| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي العملي |                                                                                                                                                                         |
|                                                                        | <b>Material Covered</b>                                                                                                                                                 |
| <b>Week 1</b>                                                          | Introduction of GIS (software package) and tools<br>-Arc Map(Arc Toolbox, Arc Object, Arc Seen)<br>-Arc Catalog                                                         |
| <b>Week 2</b>                                                          | Spatial Data<br>- Vector Data (Point, Line, polyline, Polygon)<br>- Coordinate systems and projections                                                                  |

|                |                                                                             |
|----------------|-----------------------------------------------------------------------------|
| <b>Week 3</b>  | Data Management<br>- Data input and editing<br>- Data storage and retrieval |
| <b>Week 4</b>  | Vector Data<br>- Geodatabase<br>-Query                                      |
| <b>Week 5</b>  | Spatial Data<br>- Raster Data<br>- Metadata                                 |
| <b>Week 6</b>  | Pre-processing Raster Data<br>-Image correction<br>- Composite bands        |
| <b>Week 7</b>  | Pre-processing Raster Data<br>-Clipping<br>- Mosaic                         |
| <b>Week 8</b>  | <b>Exam</b>                                                                 |
| <b>Week 9</b>  | Environmental management applications<br>- Spectral indices                 |
| <b>Week 10</b> | Conversion Tools                                                            |
| <b>Week 11</b> | Cartography Tools                                                           |
| <b>Week 12</b> | Geographic reference                                                        |
| <b>Week 13</b> | Spatial Analyst Tools                                                       |
| <b>Week 14</b> | Present projects in package form                                            |
| <b>Week 15</b> | Map Layout                                                                  |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                               |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                       | <b>Text</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Available in the Library?</b> |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>Required Texts</b> | <p>1. "Getting to Know ArcGIS" by Michael Law and Amy Collins - This book provides an introduction to ArcGIS software and covers basic GIS concepts, data management, map design, and spatial analysis.</p> <p>2. "Mastering QGIS" by Kurt Menke, GISP, Dr. Richard Smith Jr., and Dr. Luigi Pirelli - This book provides a comprehensive guide to QGIS software and covers basic to advanced GIS concepts, data management, map design, and spatial analysis.</p> <p>3. "Introduction to Geographic Information Systems" by Kang-Tsung Chang - This book provides an overview of GIS technology and covers basic to intermediate GIS concepts, spatial data, data management, and spatial analysis.</p> <p>4. "The GIS 20: Essential Skills" by Gina Clemmer - This book provides a practical guide to essential GIS skills and covers data preparation, data analysis, map creation, and data sharing.</p> <p>5. "GIS Fundamentals: A First Text on Geographic Information Systems" by Paul Bolstad - This book provides an introduction to GIS technology and covers basic GIS concepts, spatial data, data management, and spatial analysis.</p> | No                               |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |          |                                       |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|---------------------------------------|
| Recommended Texts              | 1. "GIS Tutorial 1: Basic Workbook" by Wilpen L. Gorr and Kristen S. Kurland - This book provides a hands-on introduction to ArcGIS software and covers basic GIS concepts, data management, map design, and spatial analysis.<br>2. "Discovering GIS and ArcGIS Pro" by Bradley A. Shellito - This book provides an introduction to GIS technology and covers basic GIS concepts, data management, map design, and spatial analysis using ArcGIS Pro software.<br>3. "GIS for Dummies" by Michael N. DeMers - This book provides a comprehensive introduction to GIS technology and covers basic GIS concepts, data management, map design, and spatial analysis.<br>4. "Map Use: Reading, Analysis, Interpretation" by A. Jon Kimerling, Aileen R. Buckley, and Phillip C. Muehrcke - This book provides a comprehensive guide to cartographic design and map interpretation, including an overview of GIS technology.<br>5. "Python Scripting for ArcGIS" by Paul A. Zandbergen - This book provides an introduction to Python programming for GIS applications using ArcGIS software.                                                                                                                                                                                                                                                            | No                  |          |                                       |
| Websites                       | 1. Esri: [https://www.esri.com/en-us/home ↗](https://www.esri.com/en-us/home) - This website provides resources for ArcGIS software, including tutorials, documentation, and forums.<br>2. QGIS: [https://qgis.org/en/site/ ↗](https://qgis.org/en/site/) - This website provides resources for QGIS software, including tutorials, documentation, and plugins.<br>3. USGS Earth Explorer: [https://earthexplorer.usgs.gov/ ↗](https://earthexplorer.usgs.gov/) - This website provides free access to satellite imagery data from the USGS.<br>4. OpenStreetMap: [https://www.openstreetmap.org/ ↗](https://www.openstreetmap.org/) - This website provides free and open-source map data that can be used in GIS applications.<br>5. GeoNet: [https://community.esri.com/t5/geoevents/ct-p/geoevents ↗](https://community.esri.com/t5/geoevents/ct-p/geoevents) - This website provides a community forum for GIS professionals and users to share knowledge and resources.<br>6. GIS Lounge: [https://www.gislounge.com/](https://www.gislounge.com/) - This website provides news, tutorials, and articles related to GIS technology and applications.<br>7. Geoawesomeness: [https://geoawesomeness.com/](https://geoawesomeness.com/) - This website provides news, tutorials, and articles related to geospatial technology and applications. |                     |          |                                       |
| Grading Scheme<br>مخطط الدرجات |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |          |                                       |
| Group                          | Grade                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | التقدير             | Marks %  | Definition                            |
| Success Group<br>(50 - 100)    | A – Excellent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | امتياز              | 90 - 100 | Outstanding Performance               |
|                                | B - Very Good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                | C – Good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                | D – Satisfactory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                | E – Sufficient                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 – 49)         | FX – Fail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                | F – Fail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | راسب                | (0-44)   | Considerable amount of work required  |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

### Module Information

معلومات المادة الدراسية

|                                                                         |                                       |                               |                                                                                                                                                                                                                                                     |                            |
|-------------------------------------------------------------------------|---------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Module Title                                                            | <b>Meteorology and climate change</b> |                               | Module Delivery                                                                                                                                                                                                                                     |                            |
| Module Type                                                             | <b>C</b>                              |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                            |
| Module Code                                                             | <b>RSGIS23012</b>                     |                               |                                                                                                                                                                                                                                                     |                            |
| ECTS Credits                                                            | <b>4</b>                              |                               |                                                                                                                                                                                                                                                     |                            |
| SWL (hr/sem)                                                            | <b>100</b>                            |                               |                                                                                                                                                                                                                                                     |                            |
| Module Level                                                            | <b>UGII</b>                           | Semester of Delivery          |                                                                                                                                                                                                                                                     |                            |
| Administering Department                                                | Type Dept. Code                       | College                       | Type College Code                                                                                                                                                                                                                                   |                            |
| Module Leader                                                           | Muna Hussein Ahmed                    |                               | e-mail                                                                                                                                                                                                                                              | muna.h@sc.uobaghdad.edu.iq |
| Module Leader's Acad. Title                                             | مدرس                                  | Module Leader's Qualification | Ph.D.                                                                                                                                                                                                                                               |                            |
| Module Tutor                                                            | Name (if available)                   |                               | e-mail                                                                                                                                                                                                                                              | E-mail                     |
| Peer Reviewer Name                                                      | م.د. خالد حسين عباس                   |                               | e-mail                                                                                                                                                                                                                                              | E-mail                     |
| Scientific Committee Approval Date                                      | 1/10/2025                             |                               | Version Number                                                                                                                                                                                                                                      | 1.0                        |
| <b>Relation with other Modules</b><br>العلاقة مع المواد الدراسية الأخرى |                                       |                               |                                                                                                                                                                                                                                                     |                            |
| Prerequisite module                                                     | None                                  |                               | Semester                                                                                                                                                                                                                                            |                            |
| Co-requisites module                                                    | None                                  |                               | Semester                                                                                                                                                                                                                                            |                            |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <b>Module Objectives</b><br>أهداف المادة الدراسية | <p>Meteorology and climate change are important areas of study that involve understanding the Earth's atmosphere, weather patterns, and the impact of human activities on the environment. Below are some learning objectives for these topics:</p> <ol style="list-style-type: none"> <li>1. Understand the basic principles of meteorology: Students should be able to understand the fundamental principles of meteorology, including the structure and composition of the Earth's atmosphere, the factors that influence weather patterns, and the different types of weather phenomena.</li> <li>2. Identify the causes and effects of climate change: Students should be able to identify the causes of climate change, including natural and human-induced factors, and understand the potential impact of climate change on the environment, ecosystems, and human societies.</li> </ol> |
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|                                                                             | <ol style="list-style-type: none"> <li>3. Analyze climate data: Students should be able to analyze climate data, including temperature, precipitation, and atmospheric conditions, and use this data to identify trends and patterns in weather and climate.</li> <li>4. Evaluate the impact of human activities on the environment: Students should be able to evaluate the impact of human activities on the environment, including the emission of greenhouse gases, deforestation, and land use changes, and understand how these activities contribute to climate change.</li> <li>5. Design strategies to mitigate and adapt to climate change: Students should be able to design and evaluate strategies to mitigate and adapt to climate change, including reducing greenhouse gas emissions, promoting renewable energy sources, and developing climate-resilient infrastructure.</li> <li>6. Communicate effectively about meteorology and climate change: Students should be able to communicate effectively about meteorology and climate change, including explaining scientific concepts and data to different audiences, and engaging in discussions about policy and societal impacts.</li> </ol> <p>Overall, these learning objectives aim to provide students with a comprehensive understanding of meteorology and climate change, and enable them to apply this knowledge to address the challenges and opportunities presented by these important topics.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p> | <p>Meteorology and climate change are complex and evolving fields of study with significant societal and environmental implications. Below are some learning outcomes that can be achieved through the study of meteorology and climate change:</p> <ol style="list-style-type: none"> <li>1. Understand the Earth's atmosphere: Students will be able to describe the structure and composition of the Earth's atmosphere, and explain how it interacts with the rest of the Earth's systems.</li> <li>2. Analyze weather patterns: Students will be able to use meteorological data to analyze weather patterns, including temperature, precipitation, atmospheric pressure, and wind direction and speed.</li> <li>3. Evaluate climate change data: Students will be able to evaluate and interpret climate change data, including temperature trends, sea level rise, and changes in precipitation patterns, to assess the impact of climate change on the environment and human societies.</li> <li>4. Identify the causes of climate change: Students will be able to identify the natural and human-induced causes of climate change, including deforestation, greenhouse gas emissions, and land use changes.</li> <li>5. Evaluate the impact of climate change: Students will be able to evaluate the impact of climate change on the environment, ecosystems, and human societies, including the potential for increased frequency and severity of extreme weather events.</li> <li>6. Develop strategies to mitigate and adapt to climate change: Students will be able to develop and evaluate strategies to mitigate and adapt to climate change, including reducing greenhouse gas emissions, promoting renewable energy sources, and developing climate-resilient infrastructure.</li> <li>7. Communicate effectively about meteorology and climate change: Students will be able to communicate effectively about meteorology and climate change, including explaining scientific concepts and data to different audiences, and engaging in discussions about policy and societal impacts.</li> </ol> <p>Overall, the study of meteorology and climate change can equip students with the knowledge and skills to understand the complex interactions between the Earth's atmosphere and the environment, and to develop strategies to address the challenges and</p> |

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|                                                                        | opportunities presented by climate change.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                      | <p>Meteorology and climate change are complex fields that require a comprehensive understanding of the Earth's atmosphere, weather patterns, and the impact of human activities on the environment. Below are some indicative contents that can be covered in a course on meteorology and climate change:</p> <ol style="list-style-type: none"> <li>1. Introduction to Meteorology: <ul style="list-style-type: none"> <li>- The Earth's atmosphere and its composition</li> <li>- The factors that influence weather patterns</li> <li>- The different types of weather phenomena</li> </ul> </li> <li>2. Climate Change: <ul style="list-style-type: none"> <li>- The natural and human-induced causes of climate change</li> <li>- The impact of climate change on the environment, ecosystems, and human societies</li> <li>- Climate change mitigation and adaptation strategies</li> </ul> </li> <li>3. Atmospheric Science: <ul style="list-style-type: none"> <li>- The physics and chemistry of the atmosphere</li> <li>- The role of the atmosphere in climate and weather patterns</li> <li>- The impact of atmospheric pollution on human health and the environment</li> </ul> </li> <li>4. Climate Data and Analysis: <ul style="list-style-type: none"> <li>- Understanding climate data, including temperature, precipitation, and atmospheric conditions</li> <li>- Using climate data to identify trends and patterns in weather and climate</li> <li>- Evaluating the impact of climate change on the environment and human societies</li> </ul> </li> <li>5. Climate Modeling: <ul style="list-style-type: none"> <li>- The principles of climate modeling</li> <li>- The different types of climate models and their applications</li> <li>- The limitations and uncertainties of climate modeling</li> </ul> </li> <li>6. Policy and Societal Impacts: <ul style="list-style-type: none"> <li>- The role of policy in addressing climate change</li> <li>- The impact of climate change on vulnerable populations, including low-income communities and indigenous peoples</li> <li>- The ethical considerations of climate change and environmental justice</li> </ul> </li> <li>7. Communication and Outreach: <ul style="list-style-type: none"> <li>- Effective communication strategies for explaining scientific concepts and data to different audiences</li> <li>- Engaging in discussions about policy and societal impacts of climate change</li> <li>- Communicating about climate change in the media and in public discourse</li> </ul> </li> </ol> <p>Overall, these indicative contents aim to provide students with a comprehensive understanding of meteorology and climate change, and enable them to apply this knowledge to address the challenges and opportunities presented by these important topics.</p> |
| <b>Learning and Teaching Strategies</b><br>استراتيجيات التعلم والتعليم |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Strategies</b>                                                      | <p>Meteorology and climate change are complex and multidisciplinary fields that require a variety of teaching and learning strategies to engage students and facilitate their understanding. Below are some learning and teaching strategies that can be used in a course on meteorology and climate change:</p> <ol style="list-style-type: none"> <li>1. Lectures: Lectures can be used to introduce key concepts and theories, and to provide a broad overview of the subject matter. Lectures can be supplemented with</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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|  | <p>multimedia resources such as videos, animations, and images to help students visualize abstract concepts.</p> <ol style="list-style-type: none"> <li>2. <b>Discussions:</b> Discussions can be used to encourage active learning and critical thinking. Students can be encouraged to participate in group discussions and debates on topics related to meteorology and climate change. This can help students develop their communication and analytical skills.</li> <li>3. <b>Hands-on Exercises:</b> Hands-on exercises can be used to help students apply theoretical concepts to real-world situations. For example, students can be asked to analyze climate data or use climate models to predict future climate scenarios. This can help students develop their problem-solving skills and enhance their understanding of the subject matter.</li> <li>4. <b>Case Studies:</b> Case studies can be used to help students understand the impact of climate change on different regions and populations. Students can be asked to analyze case studies and develop strategies to mitigate or adapt to the impact of climate change. This can help students develop their critical thinking and decision-making skills.</li> <li>5. <b>Field Trips:</b> Field trips can be used to help students observe and experience meteorological phenomena and climate change impacts first-hand. For example, students can visit weather stations, climate research centers, or other sites related to meteorology and climate change. This can help students develop their observational and data collection skills.</li> <li>6. <b>Online Resources:</b> Online resources such as videos, podcasts, and interactive simulations can be used to supplement classroom instruction and provide additional learning opportunities for students. These resources can be used to engage students and enhance their understanding of complex concepts.</li> </ol> <p>Overall, these learning and teaching strategies aim to provide students with a dynamic and engaging learning experience, and enable them to develop the skills and knowledge needed to address the challenges and opportunities presented by meteorology and climate change.</p> |
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| Student Workload (SWL)                      |                 |             |                                          |            |                           |
|---------------------------------------------|-----------------|-------------|------------------------------------------|------------|---------------------------|
| الحمل الدراسي للطالب محسوب لـ ١٥ اسبوع      |                 |             |                                          |            |                           |
| Structured SWL (h/sem)                      |                 |             | Structured SWL (h/w)                     |            |                           |
| الحمل الدراسي المنتظم للطالب خلال الفصل     |                 |             | الحمل الدراسي المنتظم للطالب أسبوعيا     |            |                           |
| Unstructured SWL (h/sem)                    |                 |             | Unstructured SWL (h/w)                   |            |                           |
| الحمل الدراسي غير المنتظم للطالب خلال الفصل |                 |             | الحمل الدراسي غير المنتظم للطالب أسبوعيا |            |                           |
| Total SWL (h/sem)                           |                 | 200         |                                          |            |                           |
| الحمل الدراسي الكلي للطالب خلال الفصل       |                 |             |                                          |            |                           |
| Module Evaluation                           |                 |             |                                          |            |                           |
| تقييم المادة الدراسية                       |                 |             |                                          |            |                           |
|                                             |                 | Time/Number | Weight (Marks)                           | Week Due   | Relevant Learning Outcome |
| Formative assessment                        | Quizzes         | 2           | 10% (10)                                 | 5 and 10   | LO #1, #2 and #10, #11    |
|                                             | Assignments     | 2           | 10% (10)                                 | 2 and 12   | LO #3, #4 and #6, #7      |
|                                             | Projects / Lab. | 1           | 10% (10)                                 | Continuous | All                       |
|                                             | Report          | 1           | 10% (10)                                 | 13         | LO #5, #8 and #10         |
| Summative                                   | Midterm Exam    | 2hr         | 10% (10)                                 | 7          | LO #1 - #7                |

|                                                                   |                                                                                                                                                                                                                                                                                                |     |                  |    |     |
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| assessment                                                        | Final Exam                                                                                                                                                                                                                                                                                     | 3hr | 50% (50)         | 16 | All |
| Total assessment                                                  |                                                                                                                                                                                                                                                                                                |     | 100% (100 Marks) |    |     |
| <b>Delivery Plan (Weekly Syllabus)</b><br>المنهاج الاسبوعي النظري |                                                                                                                                                                                                                                                                                                |     |                  |    |     |
|                                                                   | <b>Material Covered</b>                                                                                                                                                                                                                                                                        |     |                  |    |     |
| <b>Week 1</b>                                                     | Introduction to Meteorology<br>- The Earth's atmosphere and its composition<br>- The factors that influence weather patterns<br>- The different types of weather phenomena                                                                                                                     |     |                  |    |     |
| <b>Week 2</b>                                                     | Introduction to Meteorology<br>- The Earth's atmosphere and its composition<br>- The factors that influence weather patterns<br>- The different types of weather phenomena                                                                                                                     |     |                  |    |     |
| <b>Week 3</b>                                                     | Atmospheric Science<br>- The physics and chemistry of the atmosphere<br>- The role of the atmosphere in climate and weather patterns<br>- The impact of atmospheric pollution on human health and the environment                                                                              |     |                  |    |     |
| <b>Week 4</b>                                                     | Atmospheric Science<br>- The physics and chemistry of the atmosphere<br>- The role of the atmosphere in climate and weather patterns<br>- The impact of atmospheric pollution on human health and the environment                                                                              |     |                  |    |     |
| <b>Week 5</b>                                                     | <b>Planetary wind system</b><br>- <b>Pressure and wind system</b><br>- <b>General circulation of atmosphere</b><br>- <b>Monsoon</b>                                                                                                                                                            |     |                  |    |     |
| <b>Week 6</b>                                                     | Climate Data and Analysis<br>- Understanding climate data, including temperature, precipitation, and atmospheric conditions<br>- Using climate data to identify trends and patterns in weather and climate<br>- Evaluating the impact of climate change on the environment and human societies |     |                  |    |     |
| <b>Week 7</b>                                                     | Climate Modeling<br>- The principles of climate modeling<br>- The different types of climate models and their applications<br>- The limitations and uncertainties of climate modeling                                                                                                          |     |                  |    |     |
| <b>Week 8</b>                                                     | Climate Modeling<br>- The principles of climate modeling<br>- The different types of climate models and their applications<br>- The limitations and uncertainties of climate modeling                                                                                                          |     |                  |    |     |
| <b>Week 9</b>                                                     | Climate Change<br>- The natural and human-induced causes of climate change<br>- The impact of climate change on the environment, ecosystems, and human societies<br>- Climate change mitigation and adaptation strategies                                                                      |     |                  |    |     |
| <b>Week 10</b>                                                    | Climate Change<br>- The natural and human-induced causes of climate change<br>- The impact of climate change on the environment, ecosystems, and human societies<br>- Climate change mitigation and adaptation strategies                                                                      |     |                  |    |     |
| <b>Week 11</b>                                                    | Policy and Societal Impacts<br>- The role of policy in addressing climate change                                                                                                                                                                                                               |     |                  |    |     |

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|                | <ul style="list-style-type: none"> <li>- The impact of climate change on vulnerable populations, including low-income communities and indigenous peoples</li> <li>- The ethical considerations of climate change and environmental justice</li> </ul>                                                                                                          |
| <b>Week 12</b> | Policy and Societal Impacts <ul style="list-style-type: none"> <li>- The role of policy in addressing climate change</li> <li>- The impact of climate change on vulnerable populations, including low-income communities and indigenous peoples</li> <li>- The ethical considerations of climate change and environmental justice</li> </ul>                   |
| <b>Week 13</b> | Communication and Outreach <ul style="list-style-type: none"> <li>- Effective communication strategies for explaining scientific concepts and data to different audiences</li> <li>- Engaging in discussions about policy and societal impacts of climate change</li> <li>- Communicating about climate change in the media and in public discourse</li> </ul> |
| <b>Week 14</b> | Communication and Outreach <ul style="list-style-type: none"> <li>- Effective communication strategies for explaining scientific concepts and data to different audiences</li> <li>- Engaging in discussions about policy and societal impacts of climate change</li> <li>- Communicating about climate change in the media and in public discourse</li> </ul> |
| <b>Week 15</b> | Review and Synthesis <ul style="list-style-type: none"> <li>- Recap of key concepts and themes covered in the course</li> <li>- Discussion and analysis of current events related to meteorology and climate change</li> <li>- Final project or exam</li> </ul>                                                                                                |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                                                                                                                                                                                                                                                                                  |

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

#### Material Covered

|                |                                                                                                                                  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Field measurement of soil moisture temperature using a TDR sensor                                                                |
| <b>Week 2</b>  | Temporal and spatial monitoring of climate elements (temperature, pressure, and relative humidity) using a Baldr digital station |
| <b>Week 3</b>  | Psychrometer                                                                                                                     |
| <b>Week 4</b>  | Solar map                                                                                                                        |
| <b>Week 5</b>  | Calculating the average rainfall depth over a given area                                                                         |
| <b>Week 6</b>  | Wind rose                                                                                                                        |
| <b>Week 7</b>  | Mid exam                                                                                                                         |
| <b>Week 8</b>  | Human classifications                                                                                                            |
| <b>Week 9</b>  | Study the relationship between solar radiation and sunshine hours                                                                |
| <b>Week 10</b> | 9 Calculating evaporation mathematically                                                                                         |
| <b>Week 11</b> | Potential temperature                                                                                                            |
| <b>Week 12</b> | Determining the lifting condensation level (LCL)                                                                                 |
| <b>Week 13</b> | Determining the free convection level (FCL)                                                                                      |
| <b>Week 14</b> | review                                                                                                                           |
| <b>Week 15</b> | Final exam                                                                                                                       |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|  | Text | Available in the Library? |
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|--|------|---------------------------|

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |
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| Required Texts    | <p>There are many excellent books and resources available on meteorology and climate change. Below are some required texts that can be used in a course on meteorology and climate change:</p> <ol style="list-style-type: none"> <li>1. "Meteorology Today" by C. Donald Ahrens: This book provides a comprehensive introduction to meteorology, including an overview of the Earth's atmosphere, weather patterns, and the impact of human activities on the environment.</li> <li>2. "Climate Change: A Very Short Introduction" by Mark Maslin: This book provides a concise overview of climate change, including the science behind climate change, the impact of climate change on the environment and human societies, and the policy and societal responses to climate change.</li> <li>3. "Global Warming: The Complete Briefing" by John Houghton: This book provides a detailed overview of global warming, including the causes and effects of climate change, the science behind climate modeling, and the policy and societal responses to climate change.</li> <li>4. "The Weather Makers: How Man Is Changing the Climate and What It Means for Life on Earth" by Tim Flannery: This book provides a compelling account of the impact of human activities on the environment and the consequences of climate change for the future of life on Earth.</li> <li>5. "The Sixth Extinction: An Unnatural History" by Elizabeth Kolbert: This book provides a sobering account of the impact of climate change on the planet's biodiversity and the potential for a sixth mass extinction.</li> </ol> <p>Overall, these required texts provide a comprehensive understanding of meteorology and climate change, and enable students to engage with the complex issues and challenges presented by these important topics.</p>                                                                                                                                                                                                                                                                  | No |
| Recommended Texts | <p>In addition to the required texts, there are many other excellent books and resources available on meteorology and climate change. Below are some recommended texts that can be used in a course on meteorology and climate change:</p> <ol style="list-style-type: none"> <li>1. "The Physics of Climate" by William D. Nordhaus: This book provides a detailed overview of the physical principles underlying climate change, including the role of greenhouse gases, feedback mechanisms, and climate variability.</li> <li>2. "Climate Change Science: A Modern Synthesis" by G. Thomas Farmer and John Cook: This book provides a comprehensive overview of the scientific evidence for climate change, including the role of human activities in driving climate change and the observed impacts of climate change on the environment and human societies.</li> <li>3. "The Climate Casino: Risk, Uncertainty, and Economics for a Warming World" by William D. Nordhaus: This book provides a detailed analysis of the economic and policy implications of climate change, including the costs and benefits of different policy options for mitigating and adapting to climate change.</li> <li>4. "The End of Ice: Bearing Witness and Finding Meaning in the Path of Climate Disruption" by Dahr Jamail: This book provides a personal account of the impact of climate change on the environment and human societies, and the emotional and spiritual responses to the crisis of climate change.</li> <li>5. "Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming" edited by Paul Hawken: This book provides a comprehensive overview of the solutions and strategies for addressing climate change, including the role of renewable energy, carbon sequestration, and lifestyle changes.</li> </ol> <p>Overall, these recommended texts provide a deeper understanding of the science, policy, and societal aspects of meteorology and climate change, and enable students to engage with the complex and pressing issues presented by these important topics.</p> | No |

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| <b>Websites</b> | <p>There are many excellent websites available on meteorology and climate change that can be used as supplementary resources in a course on meteorology and climate change. Below are some recommended websites:</p> <ol style="list-style-type: none"> <li>1. National Oceanic and Atmospheric Administration (NOAA) - The NOAA website provides a wealth of information on weather, climate, and oceanography, including real-time weather data, climate models, and educational resources for students and educators.</li> <li>2. National Aeronautics and Space Administration (NASA) - The NASA website provides a range of resources on climate change, including satellite data on climate variables, climate models, and educational resources for students and educators.</li> <li>3. Intergovernmental Panel on Climate Change (IPCC) - The IPCC website provides the latest scientific information on climate change, including the physical science basis of climate change, impacts, adaptation, and mitigation.</li> <li>4. Climate Central - Climate Central provides a range of resources on climate change, including scientific research, news and analysis, and educational resources for students and educators.</li> <li>5. The Climate Reality Project - The Climate Reality Project provides a range of resources on climate change, including educational resources, advocacy tools, and news and analysis.</li> </ol> <p>Overall, these websites provide a wealth of information and resources on meteorology and climate change, and enable students to engage with the latest scientific research and policy developments in these important fields.</p> |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

### Grading Scheme

مخطط الدرجات

| Group                               | Grade                   | التقدير             | Marks %  | Definition                            |
|-------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group<br/>(50 - 100)</b> | <b>A</b> – Excellent    | امتياز              | 90 – 100 | Outstanding Performance               |
|                                     | <b>B</b> - Very Good    | جيد جدا             | 80 – 89  | Above average with some errors        |
|                                     | <b>C</b> – Good         | جيد                 | 70 – 79  | Sound work with notable errors        |
|                                     | <b>D</b> – Satisfactory | متوسط               | 60 – 69  | Fair but with major shortcomings      |
|                                     | <b>E</b> – Sufficient   | مقبول               | 50 – 59  | Work meets minimum criteria           |
| <b>Fail Group<br/>(0 – 49)</b>      | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                     | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                     |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

### Module Information

معلومات المادة الدراسية

|                     |                    |                                             |
|---------------------|--------------------|---------------------------------------------|
| <b>Module Title</b> | <b>Computer II</b> | <b>Module Delivery</b>                      |
| <b>Module Type</b>  | <b>B</b>           | <input checked="" type="checkbox"/> Theory  |
| <b>Module Code</b>  | <b>UOB203</b>      | <input checked="" type="checkbox"/> Lecture |

|                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                                                                                                                                                        |  |
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| ECTS Credits                                                                                                              | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                               | <input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |  |
| SWL (hr/sem)                                                                                                              | 75                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                               |                                                                                                                                                        |  |
| Module Level                                                                                                              | UGII                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Semester of Delivery          | 3                                                                                                                                                      |  |
| Administering Department                                                                                                  | Remote sensing and GIS department                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | College                       | college of science                                                                                                                                     |  |
| Module Leader                                                                                                             | زينب طالب درويش                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | e-mail                        |                                                                                                                                                        |  |
| Module Leader's Acad. Title                                                                                               | مدرس مساعد                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Module Leader's Qualification | Master                                                                                                                                                 |  |
| Module Tutor                                                                                                              | Name (if available)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | e-mail                        | E-mail                                                                                                                                                 |  |
| Peer Reviewer Name                                                                                                        | Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | e-mail                        | E-mail                                                                                                                                                 |  |
| Scientific Committee Approval Date                                                                                        | 1/10/2025                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Version Number                | 1.0                                                                                                                                                    |  |
| <b>Relation with other Modules</b><br>العلاقة مع المواد الدراسية الأخرى                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                                                                                                                                                        |  |
| Prerequisite module                                                                                                       | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Semester                      |                                                                                                                                                        |  |
| Co-requisites module                                                                                                      | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Semester                      |                                                                                                                                                        |  |
| <b>Module Aims, Learning Outcomes and Indicative Contents</b><br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                                                                                                                                                        |  |
| <b>Module Objectives</b><br>أهداف المادة الدراسية                                                                         | <input type="checkbox"/> To introduce students to fundamental programming concepts using Python.<br><input type="checkbox"/> To develop problem-solving skills and logical thinking through coding exercises.<br><input type="checkbox"/> To provide hands-on experience with Python for data manipulation and analysis.<br><input type="checkbox"/> To prepare students for advanced topics in computer science and software development.                                                                                        |                               |                                                                                                                                                        |  |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية                                                          | <input type="checkbox"/> Understand and apply basic programming constructs: variables, data types, and control structures.<br><input type="checkbox"/> Develop, test, and debug Python programs.<br><input type="checkbox"/> Use Python libraries for data handling and analysis.<br><input type="checkbox"/> Write reusable and modular code using functions and modules.<br><input type="checkbox"/> Implement data structures such as lists.<br><input type="checkbox"/> Apply object-oriented programming concepts in Python. |                               |                                                                                                                                                        |  |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                                                                         | <input type="checkbox"/> Introduction to Python and its environment.<br><input type="checkbox"/> Basic syntax and semantics of Python.<br><input type="checkbox"/> Control structures: loops and conditionals.<br><input type="checkbox"/> Functions: definition, scope, and recursion.<br><input type="checkbox"/> Data structures: lists.<br><input type="checkbox"/> File handling and exceptions.<br><input type="checkbox"/> Introduction to libraries for data analysis (e.g., pandas, numpy).                              |                               |                                                                                                                                                        |  |
| <b>Learning and Teaching Strategies</b><br>استراتيجيات التعلم والتعليم                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                                                                                                                                                        |  |

|                   |                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <input type="checkbox"/> Lectures to introduce theoretical concepts.<br><input type="checkbox"/> Practical lab sessions for hands-on experience.<br><input type="checkbox"/> Weekly assignments to reinforce learning.<br><input type="checkbox"/> Group projects to encourage collaboration.<br><input type="checkbox"/> Continuous assessment through quizzes and tests. |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>200</b> |                                                                           |  |

### Module Evaluation

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|                | Material Covered                                                                                 |
|----------------|--------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Learning Programming with Python Values and Variables                                            |
| <b>Week 2</b>  | Integer and String Values                                                                        |
| <b>Week 3</b>  | Identifiers User Input String Formatting                                                         |
| <b>Week 4</b>  | Expressions and Arithmetic Expressions - Arithmetic -Examples                                    |
| <b>Week 5</b>  | Conditional Statements Boolean – expressions If/Else – statement Other – Conditional Expressions |
| <b>Week 6</b>  | introduction to loops in python ( <b>Type of Loops</b> )                                         |
| <b>Week 7</b>  | Iteration Loops -                                                                                |
| <b>Week 8</b>  | Introduction -to Using Functions                                                                 |
| <b>Week 9</b>  | Functions and -Modules                                                                           |
| <b>Week 10</b> | Writing Functions -1Function -                                                                   |
| <b>Week 11</b> | Basics Parameter –Passing Custom - Functions vs Standard Functions Refactoring -                 |
| <b>Week 12</b> | Writing Functions – 2 Global - Variables                                                         |
| <b>Week 13</b> | Making – Functions ReusableFunctions as -                                                        |
| <b>Week 14</b> | Data Objects Using Objects - String, File - Objects                                              |
| <b>Week 15</b> | Introduction to Lists Building Lists                                                             |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                    |

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

|  | Material Covered |
|--|------------------|
|--|------------------|

|                |                                                        |
|----------------|--------------------------------------------------------|
| <b>Week 1</b>  | Introduction to Python environment and basic commands. |
| <b>Week 2</b>  | Working with variables and data types.                 |
| <b>Week 3</b>  | Control structures: loops and conditionals.            |
| <b>Week 4</b>  | Functions: definition and usage.                       |
| <b>Week 5</b>  | Advanced function features and error handling.         |
| <b>Week 6</b>  | Working with lists and list operations.                |
| <b>Week 7</b>  | Dictionaries and sets: creation and manipulation.      |
| <b>Week 8</b>  | File I/O: reading from and writing to files.           |
| <b>Week 9</b>  | Exception handling and debugging techniques.           |
| <b>Week 10</b> | Introduction to Python libraries for data analysis.    |
| <b>Week 11</b> | Advanced data structures and algorithms.               |
| <b>Week 12</b> | Project work and application of concepts.              |
| <b>Week 13</b> | Review and reinforcement of key concepts.              |
| <b>Week 14</b> | Final project presentations.                           |
| <b>Week 15</b> | Revision and exam preparation.                         |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>          |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                          |                                                                                                                                                                               |                                   |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
|                          | <b>Severance, Charles. Python for everybody: Exploring Data using .python 3. Charles Severance, 2016</b>                                                                      | <b>Available in the Library ?</b> |
| <b>Required Texts</b>    | Python for Everybody: Exploring Data in Python 3, by Charles Severance                                                                                                        | No                                |
| <b>Recommended Texts</b> | <input type="checkbox"/> Automate the Boring Stuff with Python, by Al Sweigart<br><input type="checkbox"/> Learning Python, by Mark Lutz                                      | No                                |
| <b>Websites</b>          | <input type="checkbox"/> <a href="#">Python Official Documentation</a><br><input type="checkbox"/> W3Schools Python Tutorial<br><input type="checkbox"/> GeeksforGeeks Python |                                   |

### Grading Scheme

مخطط الدرجات

| Group                           | Grade                   | التقدير             | Marks %  | Definition                            |
|---------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group (50 - 100)</b> | <b>A</b> – Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                 | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                 | <b>C</b> – Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                 | <b>D</b> - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                 | <b>E</b> – Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group (0 – 49)</b>      | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                 | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                 |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

### Module Information

معلومات المادة الدراسية

| Module Title | Baath Regime Crimes in Iraq | Module Delivery                                                                                                                                                                                          |
|--------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module Type  | Core                        | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code  | UOB105                      |                                                                                                                                                                                                          |
| ECTS Credits | 2                           |                                                                                                                                                                                                          |
| SWL (hr/sem) | 50                          |                                                                                                                                                                                                          |

|                                    |                     |                               |                   |
|------------------------------------|---------------------|-------------------------------|-------------------|
| Module Level                       | <b>UGII</b>         | Semester of Delivery          | 3                 |
| Administering Department           | S                   | College                       | Type College Code |
| Module Leader                      | مهند العماري        | e-mail                        |                   |
| Module Leader's Acad. Title        |                     | Module Leader's Qualification | Ph.D.             |
| Module Tutor                       | Name (if available) | e-mail                        | E-mail            |
| Peer Reviewer Name                 | Name                | e-mail                        | E-mail            |
| Scientific Committee Approval Date | 1/10/2025           | Version Number                | 1.0               |

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                      |      |          |  |
|----------------------|------|----------|--|
| Prerequisite module  | None | Semester |  |
| Co-requisites module | None | Semester |  |

|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module Objectives<br>أهداف المادة الدراسية                | <p>يهدف هذا المقرر الدراسي إلى تعزيز فهم الطلاب للجرائم والانتهاكات التي وقعت خلال فترة نظام البعث في العراق وتأثيرها على الأفراد والمجتمع، وتشجيع التحليل والنقاش حول هذه القضايا المهمة. ومن أبرز الأهداف للمادة الدراسية هي اني يكون الطالب قادراً على أن :</p> <ol style="list-style-type: none"> <li>1. فهم مفهوم الجرائم وأقسامها.</li> <li>2. دراسة جرائم نظام البعث والقوانين المتعلقة بها.</li> <li>3. التعرف على الجرائم النفسية والاجتماعية وأثارها على الفرد والمجتمع.</li> <li>4. تحليل الانتهاكات القانونية في العراق، بما في ذلك الانتهاكات لحقوق الإنسان والجرائم ذات الصلة.</li> <li>5. فهم الجرائم البيئية وأثارها، بما في ذلك التلوث وتدمير المدن والقرى وتجفيف الأهوار.</li> </ol> <p>دراسة جرائم المقابر الجماعية وفهم أحداث المقابر والتصنيف الزمني لها في العراق.</p>                                                                                                                                                    |
| Module Learning Outcomes<br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"> <li>1. فهم مفهوم الجرائم وقدرة الطلاب على تصنيف الجرائم وفقاً لأقسامها.</li> <li>2. تحليل جرائم نظام البعث وفهم القوانين المتعلقة بها، بما في ذلك الجرائم الدولية.</li> <li>3. القدرة على التعرف على الجرائم النفسية لنظام البعث وفهم الآثار النفسية لجرائم نظام البعث على الأفراد والمجتمع.</li> <li>4. القدرة على التعرف على الجرائم الاجتماعية لنظام البعث والآثار الاجتماعية لجرائم نظام البعث على الأفراد والمجتمع.</li> <li>5. التعرف على الانتهاكات القانونية لنظام البعث في العراق وفهم أنواع الانتهاكات ومكان احتجاز الأفراد.</li> <li>6. التعرف على صور انتهاكات حقوق الإنسان وجرائم السلطة التي وقعت خلال فترة نظام البعث.</li> <li>7. التعرف على الانتهاكات السياسية والعسكرية لنظام البعث.</li> <li>8. فهم الجرائم البيئية لنظام البعث والقدرة على تحليل تأثيرها على البيئة والمجتمع.</li> <li>9. دراسة جرائم المقابر الجماعية لنظام البعث.</li> </ol> <p>مخرجات التعلم للمادة الدراسية هي:</p> |

|                                                                                                                                                                                                                  |                                                                                                                                                                     |                 |                                                                     |          |                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------|----------|---------------------------|
| Indicative Contents<br>المحتويات الإرشادية                                                                                                                                                                       | فهم الأحداث المرتبطة بجرائم المقابر الجماعية وتصنيفها زمنياً.                                                                                                       |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | المحتويات الإرشادية في مادة اللغة تشمل مجموعة من المفاهيم والمواضيع التي يتم تغطيتها خلال عملية التعلم. ومن بين المحتويات الإرشادية المهمة:                         |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 1. تعريف الجريمة لغة واصطلاحاً، مفهوم الجريمة، اقسام الجريمة                                                                                                        |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 2. جرائم نظام البعث وفق توثيق قانون المحكمة الجنائية العراقية العليا عام 2005                                                                                       |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 3. الجرائم النفسية والاجتماعية وأثارها                                                                                                                              |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 4. عسكرة المجتمع، موقف النظام البعثي من الدين                                                                                                                       |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 5. انتهاكات القوانين العراقية، صور انتهاكات حقوق الإنسان وجرائم السلطة                                                                                              |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 6. بعض قرارات الانتهاكات السياسية والعسكرية لنظام البعث                                                                                                             |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 7. أماكن السجون والاحتجاز لنظام البعث                                                                                                                               |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 8. الجرائم البيئية لنظام البعث في العراق                                                                                                                            |                 |                                                                     |          |                           |
| 9. جرائم المقابر الجماعية                                                                                                                                                                                        |                                                                                                                                                                     |                 |                                                                     |          |                           |
| 10. أحداث مقابر الإبادة الجماعية المرتكبة من النظام البعثي في العراق                                                                                                                                             |                                                                                                                                                                     |                 |                                                                     |          |                           |
| التصنيف الزمني لمقابر الإبادة الجماعية في العراق للمدة 1963م - 2003م                                                                                                                                             |                                                                                                                                                                     |                 |                                                                     |          |                           |
| Learning and Teaching Strategies                                                                                                                                                                                 |                                                                                                                                                                     |                 |                                                                     |          |                           |
| استراتيجيات التعلم والتعليم                                                                                                                                                                                      |                                                                                                                                                                     |                 |                                                                     |          |                           |
| Strategies                                                                                                                                                                                                       | استراتيجيات التعلم والتعليم المستخدمة في مادة جرائم حزب البعث البائد تشمل مجموعة متنوعة من النهج والتقنيات التي تعزز عملية التعلم للطلاب. من بين هذه الاستراتيجيات: |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 1. التفاعل النشط: يتم تشجيع الطلاب على المشاركة والمشاركة الفعالة في الدروس من خلال المناقشات الجماعية والأنشطة التفاعلية.                                          |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 2. التعلم التعاوني: يشجع التعاون والتعاون بين الطلاب من خلال العمل الجماعي والمشاريع الجماعية، حيث يتعاون الطلاب مع بعضهم البعض لتحقيق أهداف التعلم المحددة.        |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 3. استخدام التقنيات الحديثة: يستفيد الطلاب من استخدام التكنولوجيا في عملية التعلم، مثل استخدام الحواسيب والإنترنت للبحث والتعلم الذاتي.                             |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  | 4. توفير ردود فعل فورية: يتم توفير ردود فعل فورية وتقييم مستمر للطلاب، سواء عن طريق التقييمات الشفهية أو الكتابية، مما يساعدهم على تحسين أدائهم وتطوير مهاراتهم.    |                 |                                                                     |          |                           |
| التنوع في وسائل التواصل: يتم استخدام مجموعة متنوعة من وسائل التواصل والتعليم، مثل المحاضرات التوضيحية، والمناقشات الجماعية، والأنشطة العملية، والعروض التقديمية، لتلبية احتياجات وأساليب التعلم المختلفة للطلاب. |                                                                                                                                                                     |                 |                                                                     |          |                           |
| Student Workload (SWL)                                                                                                                                                                                           |                                                                                                                                                                     |                 |                                                                     |          |                           |
| الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعاً                                                                                                                                                                         |                                                                                                                                                                     |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  |                                                                                                                                                                     |                 |                                                                     |          |                           |
| Structured SWL (h/sem)<br>الحمل الدراسي المنتظم للطلاب خلال الفصل                                                                                                                                                |                                                                                                                                                                     | 33              | Structured SWL (h/w)<br>الحمل الدراسي المنتظم للطلاب أسبوعياً       |          | 2.2                       |
| Unstructured SWL (h/sem)<br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل                                                                                                                                          |                                                                                                                                                                     | 17              | Unstructured SWL (h/w)<br>الحمل الدراسي غير المنتظم للطلاب أسبوعياً |          | 1.13                      |
| Total SWL (h/sem)<br>الحمل الدراسي الكلي للطلاب خلال الفصل                                                                                                                                                       |                                                                                                                                                                     | 50              |                                                                     |          |                           |
|                                                                                                                                                                                                                  |                                                                                                                                                                     |                 |                                                                     |          |                           |
| Module Evaluation                                                                                                                                                                                                |                                                                                                                                                                     |                 |                                                                     |          |                           |
| تقييم المادة الدراسية                                                                                                                                                                                            |                                                                                                                                                                     |                 |                                                                     |          |                           |
|                                                                                                                                                                                                                  |                                                                                                                                                                     | Time/<br>Number | Weight (Marks)                                                      | Week Due | Relevant Learning Outcome |
| Formative assessment                                                                                                                                                                                             | Quizzes                                                                                                                                                             | 1               | 10% (10)                                                            | 3        | LO #1, 2                  |
|                                                                                                                                                                                                                  | Assignments                                                                                                                                                         | 1               | 10% (10)                                                            | 8        | LO #5-8                   |
|                                                                                                                                                                                                                  | Projects.                                                                                                                                                           | 1               | 10% (10)                                                            | 11       | LO #1-10                  |
|                                                                                                                                                                                                                  | Report                                                                                                                                                              | 1               | 10% (10)                                                            | 14       | LO # 1-11                 |
| Summative assessment                                                                                                                                                                                             | Midterm Exam                                                                                                                                                        | 2 hours         | 10% (10)                                                            | 7        | LO # 1-6                  |
|                                                                                                                                                                                                                  | Final Exam                                                                                                                                                          | 3 hours         | 50% (50)                                                            | 16       | All                       |
| Total assessment                                                                                                                                                                                                 |                                                                                                                                                                     |                 | 100%(100Marks)                                                      |          |                           |

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

|               | Material Covered                                                                              |
|---------------|-----------------------------------------------------------------------------------------------|
| Week 1        | تعريف الجريمة لغة واصطلاحاً، مفهوم الجريمة، اقسام الجريمة                                     |
| Week 2        | جرائم نظام البعث وفق توثيق قانون المحكمة الجنائية العراقية العليا عام 2005                    |
| Week 3        | الجرائم النفسية لنظام البعث وفهم الآثار النفسية لجرائم نظام البعث على الأفراد والمجتمع.       |
| Week 4        | الجرائم الاجتماعية لنظام البعث وفهم الآثار الاجتماعية لجرائم نظام البعث على الأفراد والمجتمع. |
| Week 5        | انتهاكات القوانين العراقية                                                                    |
| Week 6        | بعض قرارات الانتهاكات السياسية والعسكرية لنظام البعث                                          |
| Week 7        | امتحان نصف الفصل                                                                              |
| Week 8        | الجرائم البيئية لنظام البعث في العراق (التلوث الحربي وسياسة الأرض المحروقة)                   |
| Week 9-10     | تجفيف الاهوار و تجريف بساتين النخيل والأشجار والمزروعات                                       |
| Week 11-12    | جرائم المقابر الجماعية واحداث مقابر الإبادة الجماعية المرتكبة من النظام البعث في العراق       |
| Week 13-14-15 | التصنيف الزمني لمقابر الإبادة الجماعية في العراق للمدة من (1963-2003) م                       |
| Week 16       | التهيئة لامتحان النهائي                                                                       |

## Learning and Teaching Resources

### مصادر التعلم والتدريس

|                   | Text                                                                                | Available in the Library? |
|-------------------|-------------------------------------------------------------------------------------|---------------------------|
| Required Texts    | منهاج وزارة التعليم العالي والبحث العلمي العراقية - جرائم نظام البعث في العراق 2023 | Yes                       |
| Recommended Texts |                                                                                     | No                        |
| Websites          | The Collage E-Library                                                               |                           |

## Grading Scheme

### مخطط الدرجات

|                                   | Grade            | التقدير             | Marks (%) | Definition                            |
|-----------------------------------|------------------|---------------------|-----------|---------------------------------------|
| Group Success Group<br>(50 - 100) | A - Excellent    | امتياز              | 90 - 100  | Outstanding Performance               |
|                                   | B - Very Good    | جيد جداً            | 80 - 89   | Above average with some errors        |
|                                   | C - Good         | جيد                 | 70 - 79   | Sound work with notable errors        |
|                                   | D - Satisfactory | متوسط               | 60 - 69   | Fair but with major shortcomings      |
|                                   | E - Sufficient   | مقبول               | 50 - 59   | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)            | FX – Fail        | راسب (قيد المعالجة) | (45-49)   | More work required but credit awarded |
|                                   | F – Fail         | راسب                | (0-44)    | Considerable amount of work required  |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

(المرحلة الثانية/ الفصل الثاني)

## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

| Module Information                 |                          |                                                                                                                                                                                                                                                     |                               |                      |
|------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------|
| معلومات المادة الدراسية            |                          |                                                                                                                                                                                                                                                     |                               |                      |
| Module Title                       | Remote Sensing Physics   |                                                                                                                                                                                                                                                     | Module Delivery               |                      |
| Module Type                        | C                        | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                               |                      |
| Module Code                        | RSGIS24014               |                                                                                                                                                                                                                                                     |                               |                      |
| ECTS Credits                       | 6                        |                                                                                                                                                                                                                                                     |                               |                      |
| SWL (hr/sem)                       | 150                      |                                                                                                                                                                                                                                                     |                               |                      |
| Module Level                       | UGII                     |                                                                                                                                                                                                                                                     |                               | Semester of Delivery |
| Administering Department           | Type Dept. Code          | College                                                                                                                                                                                                                                             | Type College Code             |                      |
| Module Leader                      | Zehraa najim abdul-ameer |                                                                                                                                                                                                                                                     | e-mail                        |                      |
| Module Leader's Acad. Title        | Professor                |                                                                                                                                                                                                                                                     | Module Leader's Qualification | Ph.D.                |
| Module Tutor                       | Name (if available)      |                                                                                                                                                                                                                                                     | e-mail                        | E-mail               |
| Peer Reviewer Name                 | Falih hassan mahmoud     |                                                                                                                                                                                                                                                     | e-mail                        | E-mail               |
| Scientific Committee Approval Date | 10/3/2026                |                                                                                                                                                                                                                                                     | Version Number                | 1.0                  |

### Relation with other Modules

#### العلاقة مع المواد الدراسية الأخرى

|                      |      |          |  |
|----------------------|------|----------|--|
| Prerequisite module  | None | Semester |  |
| Co-requisites module | None | Semester |  |

### Module Aims, Learning Outcomes and Indicative Contents

#### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module Objectives<br>أهداف المادة الدراسية | <ol style="list-style-type: none"><li>1. Understand the basic principles of blackbody radiation and the origin of electromagnetic radiation from objects.</li><li>2. Describe the electromagnetic spectrum and the different spectral regions used in remote sensing.</li><li>3. Understand the principles of energy and matter interactions with electromagnetic radiation, including absorption, emission and scattering.</li><li>4. Explain the principles of radiative transfer and atmospheric interactions that affect electromagnetic radiation propagating through the atmosphere.</li></ol> |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                             | <ol style="list-style-type: none"> <li>Describe the concepts of spatial, spectral, radiometric and temporal resolution in remote sensing and how they influence data quality.</li> <li>Apply the equations for radiance, irradiance and brightness temperature to solve remote sensing radiometry problems.</li> <li>Calculate signal-to-noise ratio and understand factors affecting sensor performance.</li> <li>Describe the physics principles of various remote sensing platforms and sensor types including multispectral, hyperspectral, thermal and LiDAR systems.</li> <li>Analyze and interpret remote sensing images and derive geophysical parameters from the image data using appropriate radiative transfer models.</li> <li>Develop an understanding of emerging remote sensing technologies and their potential applications.</li> </ol> <p>This course aims to provide students with a solid foundation in the underlying physical principles that govern the generation, propagation and detection of electromagnetic radiation involved in remote sensing systems and applications. The emphasis is on developing an understanding of the relevant concepts and theories through quantitative problem solving and data analysis.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p> | <ul style="list-style-type: none"> <li>Students will understand the physical principles of blackbody radiation and the origin of electromagnetic radiation from different objects and materials.</li> <li>Students will be able to describe the electromagnetic spectrum utilized for remote sensing and explain the spectral signatures of earth surface features.</li> <li>Students will understand the principles of energy and matter interactions with electromagnetic radiation including absorption, emission and scattering.</li> <li>Students will be able to explain the concepts of spatial, spectral, radiometric and temporal resolution in remote sensing and their influences on data quality and information extraction.</li> <li>Students will be able to apply the relevant radiometry equations to solve remote sensing problems involving radiance, irradiance, reflectance and brightness temperature.</li> <li>Students will be able to interpret sensor performance parameters such as signal-to-noise ratio and understand factors affecting them.</li> <li>Students will understand the principles of operation and capabilities of different remote sensing platforms and sensor types.</li> <li>Students will be able to analyze and interpret remote sensing images and extract geophysical parameters using appropriate radiative transfer models.</li> <li>Students will develop an awareness of emerging remote sensing technologies and their potential applications.</li> <li>Students will be able to communicate technical concepts related to the physics of remote sensing clearly and precisely in speech and writing.</li> </ul> <p>The key difference between objectives and outcomes is that:</p> <ul style="list-style-type: none"> <li>Objectives describe what students will learn and skills they will develop.</li> <li>Outcomes describe what students will be able to do by the end of the course as a result of achieving the objectives.</li> </ul> |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>                | <ol style="list-style-type: none"> <li>Introduction <ul style="list-style-type: none"> <li>Overview of remote sensing concepts and applications</li> <li>Electromagnetic radiation and the electromagnetic spectrum</li> </ul> </li> <li>Blackbody radiation and radiation laws <ul style="list-style-type: none"> <li>Blackbody radiation and Planck's law</li> <li>Stefan-Boltzmann and Wien's displacement laws</li> </ul> </li> <li>Interactions of radiation with matter</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>- Reflection, absorption and emission</li> <li>- Transmission and scattering</li> </ul> <p>4. Radiometry</p> <ul style="list-style-type: none"> <li>- Definition of radiometric terms: radiance, irradiance, reflectance</li> <li>- Brightness temperature</li> <li>- Sensor performance parameters</li> </ul> <p>5. Remote sensing platforms and sensors</p> <ul style="list-style-type: none"> <li>- Platforms: satellite, airborne, UAV</li> <li>- Multispectral, hyperspectral, thermal and LiDAR sensors</li> </ul> <p>6. Atmospheric effects</p> <ul style="list-style-type: none"> <li>- Absorption, transmission and scattering in atmosphere</li> <li>- Atmospheric correction</li> </ul> <p>7. Spatial, spectral, radiometric and temporal resolution</p> <ul style="list-style-type: none"> <li>- Factors determining resolution</li> <li>- Effects on data quality</li> </ul> <p>8. Radiative transfer models</p> <ul style="list-style-type: none"> <li>- Forward and inversion models</li> <li>- Case studies using models</li> </ul> <p>9. Advanced topics</p> <ul style="list-style-type: none"> <li>- Emerging technologies and applications</li> <li>- Recent research trends</li> </ul> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <ul style="list-style-type: none"> <li>• Lectures: Initial introduction of concepts, theories and derivations through formal lectures. This provides a unified presentation of foundational knowledge.</li> <li>• Demonstrate examples: Use plenty of examples to demonstrate application of physics principles to remote sensing problems. Work through sample calculations step-by-step.</li> <li>• Assign practical work: Give regular assignments involving interpreting remote sensing data and applying radiative transfer models. Provide feedback to reinforce understanding.</li> <li>• Use of software: Integrate the use of remote sensing software tools like ENVI, ERDAS and SNAP early on. Students can practice analyzing real data.</li> <li>• Group activities: Assign group projects requiring students to propose solutions to remote sensing problems or interpret case studies. This fosters collaborative skills.</li> <li>• Tutorials: Include tutorial sessions where students work through example problems and calculations under supervision. This develops practical skills.</li> <li>• Use multiple representations: Explain concepts using graphical, algebraic, verbal and concrete data representations. Students make connections across representations.</li> <li>• Discussions: Have in-class discussions for students to share strategies for solving challenging application problems. This stimulates higher-order thinking.</li> <li>• Formative assessments: Use frequent low-stakes quizzes, exercises and checks for understanding. This helps identify gaps and difficulties for remediation.</li> <li>• Summative assessments: Use midterms and final exams to assess overall learning at checkpoints. This ensures accountability.</li> </ul> |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>Provide support: Offer office hours, study groups and additional resources for students struggling with concepts. Adjust pace and provide alternatives where needed.</li> </ul> <p>The key is to combine traditional lectures and demonstrations with active learning strategies like hands-on software use, practical projects, and real data analysis. This aims to help develop students' conceptual understanding, computational ability and strategic competence in applying physics principles for remote sensing applications.</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| <b>Student Workload (SWL)</b><br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا       |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>200</b> |                                                                           |  |

| <b>Module Evaluation</b><br>تقييم المادة الدراسية |                        |             |                  |            |                           |
|---------------------------------------------------|------------------------|-------------|------------------|------------|---------------------------|
|                                                   |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
| <b>Formative assessment</b>                       | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                                                   | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                                                   | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                                                   | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b>                       | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                                                   | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>                           |                        |             | 100% (100 Marks) |            |                           |

| <b>Delivery Plan (Weekly Syllabus)</b><br>المنهاج الاسبوعي النظري |                                                                                                        |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|                                                                   | Material Covered                                                                                       |
| <b>Week 1</b>                                                     | Introduction to Remote Sensing - Definitions, electromagnetic spectrum, active vs passive sensing      |
| <b>Week 2</b>                                                     | Electromagnetic Radiation - Wave theory, electromagnetic spectrum, blackbody radiation                 |
| <b>Week 3</b>                                                     | Atmosphere and Atmospheric Effects - Attenuation, scattering, absorption, atmospheric windows          |
| <b>Week 4</b>                                                     | Radiative Transfer - Emission, reflection, refraction, radiance, irradiance, BRDF                      |
| <b>Week 5</b>                                                     | Optics and Imaging Systems - Lenses, mirrors, diffraction, resolution, MTF, focal plane arrays         |
| <b>Week 6</b>                                                     | Spectroscopy - Line spectra, band spectra, spectral signatures, spectral resolution                    |
| <b>Week 7</b>                                                     | Thermal Emission and Microwave Radiation - Planck's law, Rayleigh-Jeans approximation, microwave bands |
| <b>Week 8</b>                                                     | Image Acquisition and Processing - Sampling, quantization, preprocessing, image enhancement            |
| <b>Week 9</b>                                                     | Active Microwave Sensing - SAR, InSAR, radar polarimetry, radar interferometry, lidar                  |

|                |                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------|
| <b>Week 10</b> | Optical and Thermal Passive Sensing - Multispectral vs hyperspectral sensing, thermal bands                |
| <b>Week 11</b> | Principles of Image Analysis and Classification - Pixels, objects, shape, texture, pattern, classification |
| <b>Week 12</b> | Platforms and Sensors - Satellites, aircraft, UAVs, Landsat, MODIS, Hyperion etc.                          |
| <b>Week 13</b> | Applications of Remote Sensing - Land cover, agriculture, forestry, geology, oceanography, environment     |
| <b>Week 14</b> | Integration of Remote Sensing and GIS - Georeferencing, data models, analysis and modelling                |
| <b>Week 15</b> | Emerging Trends - UAVs, lidar, hyperspectral sensing, data mining, cloud computing                         |
| <b>Week 16</b> | Student Presentations on Selected Remote Sensing Applications                                              |

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

|                | Material Covered                                                                                                                                                                       |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Photo-Voltaic Cell (Spectral Distribution)                                                                                                                                             |
| <b>Week 2</b>  | Verifying the inverse square law                                                                                                                                                       |
| <b>Week 3</b>  | Determination the Focal Length of Convex Lens part1                                                                                                                                    |
| <b>Week 4</b>  | Determination the Focal Length of Convex Lens part2                                                                                                                                    |
| <b>Week 5</b>  | Aberration of Lenses part1                                                                                                                                                             |
| <b>Week 6</b>  | Aberration of Lenses part 2                                                                                                                                                            |
| <b>Week 7</b>  | Determination of the refractive index of a solid and a liquid via-different methods Part (1)<br>Determination of the refractive index of a liquid via the air cell method              |
| <b>Week 8</b>  | Determination of the refractive index of a solid and a liquid via-different methods Part (2)<br>Determination of the refractive index of a liquid using a convex lens-and plane mirror |
| <b>Week 9</b>  | midexam                                                                                                                                                                                |
| <b>Week 10</b> | Determination of the refractive index of a solid and a liquid via different methods Part (3)<br>Determination of the refractive index of a liquid using a concave, mirror              |
| <b>Week 11</b> | Determination of the refractive index of a solid using a traveling, microscope                                                                                                         |
| <b>Week 12</b> | The prism and estimation its dispersion and-resolving powers part1                                                                                                                     |
| <b>Week 13</b> | The prism and estimation its dispersion and-resolving powers part2                                                                                                                     |
| <b>Week 14</b> | Seminar (reports)                                                                                                                                                                      |
| <b>Week 15</b> | Final exam                                                                                                                                                                             |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|  | Text | Available in the Library ? |
|--|------|----------------------------|
|--|------|----------------------------|

|                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                       |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <p style="text-align: center;"><b>Required Texts</b></p>    | <ol style="list-style-type: none"> <li>1. Remote Sensing of the Environment: An Earth Resource Perspective - John R. Jensen. This is a comprehensive introductory text covering all aspects of remote sensing including physics, sensors, platforms, image analysis and applications. It provides a good overview and background for a course.</li> <li>2. Introduction to the Physics and Techniques of Remote Sensing - Charles Elachi and Jakob van Zyl. This book also provides a good introduction to the physical principles behind remote sensing and the techniques used for airborne and spaceborne systems. It covers the essential theory in an accessible manner for students.</li> <li>3. Elements of Photogrammetry - Paul R. Wolf and Bon A. Dewitt. This seminal text covers the geometry and mathematics of remote sensing including the measurement, representation and analysis of spatial optical data. For students interested in photogrammetry, this would provide further reading.</li> <li>4. Hyperspectral Remote Sensing: Principles and Applications - Chein-I Chang. For courses covering hyperspectral remote sensing in detail, this book provides an overview of the principles, sensors, algorithms and applications of hyperspectral remote sensing.</li> </ol> <p>These types of remote sensing texts focused on the theory and physics tend to provide solid references and resources for students. Instructors can choose a combination of a broad introductory text along with a more focused theoretical text to suit the course level and specific areas of emphasis. Let me know if you require any additional recommendations.</p> | <p style="text-align: center;">No</p> |
| <p style="text-align: center;"><b>Recommended Texts</b></p> | <ol style="list-style-type: none"> <li>1. Remote Sensing Digital Image Analysis: An Introduction - John A. Richards and Xiuping Jia. This book provides a good overview of digital image analysis for remote sensing, covering radiometric correction, filtering, texture analysis, segmentation and classification. It is a useful reference for the image analysis techniques and applications part of the course.</li> <li>2. "Physics of Light and Optics" - Michael Vollmer, Heinz-Dieter Knoedler. This book covers the fundamentals of light and optics in an engaging yet rigorous manner. For students lacking background in electrodynamics and optics, sections of this book would provide useful reading to develop the requisite concepts to understand remote sensing physics.</li> <li>3. "Remote Sensing of the Environment: An Earth Resource Perspective" by John R. Jensen - This book provides a comprehensive overview of remote sensing principles and applications, with a focus on environmental monitoring and natural resource management.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p style="text-align: center;">No</p> |

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Websites | <ul style="list-style-type: none"> <li>NASA Earth Observatory - <a href="https://earthobservatory.nasa.gov/">https://earthobservatory.nasa.gov/</a><br/>This NASA website has excellent educational resources on remote sensing concepts, applications and data. It provides an insider's view into satellite observations of Earth.</li> <li>Environment Canada - <a href="https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/remote-sensing.html">https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/remote-sensing.html</a><br/>Environment Canada's remote sensing page has useful information, data and tools relating to remote sensing applications over Canada.</li> <li>NASA Remote Sensing Tutorial - <a href="https://fm.cua.edu/HD38_RST/">https://fm.cua.edu/HD38_RST/</a><br/>This comprehensive tutorial covers the physical principles of remote sensing and the components and functions of remote sensing systems.</li> <li>USGS Landsat Missions - <a href="https://www.usgs.gov/land-resources/nli/landsat">https://www.usgs.gov/land-resources/nli/landsat</a><br/>The USGS Landsat website has information on the Landsat satellite missions, data access, educational resources, and a glossary of remote sensing terms.</li> <li>ISPRS TC VII - <a href="https://www.isprs.org/commission7/">https://www.isprs.org/commission7/</a><br/>The International Society for Photogrammetry and Remote Sensing - Commission VII focuses on sensor systems, instrument calibration and radiometric aspects.</li> </ul> |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Grading Scheme<br>مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                       |                  |                     |          |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|----------|---------------------------------------|
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade            | التقدير             | Marks %  | Definition                            |
| Success Group<br>(50 - 100)                                                                                                                                                                                                                                                                                                                                                          | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)                                                                                                                                                                                                                                                                                                                                                               | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
| <b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |                  |                     |          |                                       |

| Module Information      |                             |                 |
|-------------------------|-----------------------------|-----------------|
| معلومات المادة الدراسية |                             |                 |
| Module Title            | Digital Image Processing II | Module Delivery |

|                                    |                     |                     |                                                                                                                                                                                                                                                     |                              |       |
|------------------------------------|---------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------|
| Module Type                        | C                   |                     | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                              |       |
| Module Code                        | RSGIS24015          |                     |                                                                                                                                                                                                                                                     |                              |       |
| ECTS Credits                       | 8                   |                     |                                                                                                                                                                                                                                                     |                              |       |
| SWL (hr/sem)                       | 200                 |                     |                                                                                                                                                                                                                                                     |                              |       |
| Module Level                       |                     | UGII                | Semester of Delivery                                                                                                                                                                                                                                |                              | 4     |
| Administering Department           |                     | Type Dept. Code     | College                                                                                                                                                                                                                                             | Type College Code            |       |
| Module Leader                      | Bushra ali ahmed    |                     | e-mail                                                                                                                                                                                                                                              | Bushra.a@sc.uobaghdad.edu.iq |       |
| Module Leader's Acad. Title        |                     | Assistant Professor | Module Leader's Qualification                                                                                                                                                                                                                       |                              | Ph.D. |
| Module Tutor                       | Name (if available) |                     | e-mail                                                                                                                                                                                                                                              | E-mail                       |       |
| Peer Reviewer Name                 |                     | Name                | e-mail                                                                                                                                                                                                                                              | E-mail                       |       |
| Scientific Committee Approval Date |                     | 10/3/2025           | Version Number                                                                                                                                                                                                                                      | 1.0                          |       |

### Relation with other

**Modules** العلاقة مع المواد الدراسية الأخرى

|                      |                          |          |  |
|----------------------|--------------------------|----------|--|
| Prerequisite module  | Digital Image Processing | Semester |  |
| Co-requisites module | None                     | Semester |  |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objective</b><br>اهداف المادة الدراسية | <p>Here are some learning objectives for a course on digital image processing:</p> <ol style="list-style-type: none"> <li>1. To understand the sensing, acquisition and storage of digital images.</li> <li>2. To study the image fundamentals and mathematical transforms necessary for image processing.</li> <li>3. To understand the digital processing systems and corresponding terminology.</li> <li>4. To understand the base image transformation domains and methods.</li> <li>5. To have an understanding of colour models, type of image representations and related statistics.</li> <li>6. To study the image enhancement techniques.</li> <li>7. To study image restoration.</li> </ol> <p>Finally, this course is designed to give undergraduate students all the fundamentals in 2-D digital image processing with emphasis in image processing techniques, image filtering design and applications.</p> |
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| <b>Module Learning Outcomes</b><br><br>مخرجات التعلم للمادة الدراسية                                       | <p>After completing a course on digital image processing , students should be able to:</p> <ol style="list-style-type: none"> <li>1. Have a clear understanding of the principals the Digital Image Processing terminology used to describe features of images.</li> <li>2. Have a good understanding of the mathematical foundations for digital manipulation of images; image acquisition; preprocessing; Fourier domain processing.</li> <li>3. Be able to write programs using Matlab language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression.</li> <li>4. Have knowledge of the Digital Image Processing Systems.</li> <li>5. Be able to understand the documentation for, and make use of, the MATLAB library and MATLAB Digital Image Processing Toolbox (IPT).</li> <li>6. Learn and understand the Image Enhancement in the Spatial Domain.</li> <li>7. Learn and understand the Image Enhancement in the Frequency Domain.</li> <li>8. Understand the Image Restoration, Representation and Description.</li> </ol> <p>Finally, The students would get a firm foundation in 2-D image processing and be able to handle real-world image processing problems.</p> |
| <b>Indicative Contents</b><br><br>المحتويات الإرشادية                                                      | <p>Here are some indicative contents that may be covered in a course on digital image processing :</p> <ol style="list-style-type: none"> <li>1. Image sources and generation</li> <li>2. Image sampling and quantization</li> <li>3. Same basic relationship between pixels</li> <li>4. Intensity transformations and spatial filtering background.</li> <li>5. Some Basic Intensity Transformation Functions</li> <li>6. Histogram Processing</li> <li>7. Fundamentals of Spatial Filtering</li> <li>8. Smoothing Spatial Filters</li> <li>9. Sharpening Spatial Filters</li> <li>10. Combining Spatial Enhancement Methods</li> <li>11. The Discrete Fourier Transform (DFT) of one Variable</li> <li>12. Extension to Functions of Two Variables</li> <li>13. Some Properties of the 2-D Discrete Fourier Transform</li> <li>14. The Basics of Filtering in the Frequency Domain</li> <li>15. Image Smoothing Using Frequency Domain Filters</li> <li>16. Image Sharpening Using Frequency Domain Filters</li> <li>17. Basic Image Rrestoration techniques</li> </ol>                                                                                                                                                                                  |
| <p style="text-align: center;"><b>Learning and Teaching Strategies</b><br/> ستراتيجيات التعلم والتعليم</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Strategies</b>                                                                                          | <p>Here are some learning and teaching strategies that may be effective for a course on Digital image processing :</p> <ol style="list-style-type: none"> <li>1. Lectures: Lectures can provide an overview of key concepts and techniques in digital image processing.</li> <li>2. Education: provide lectures and printed sources from the modern, diverse and rich sources including examples</li> <li>3. Education: Harnessing smart blackboard to the goal of teaching students and explain the steps the solution and extraction results</li> <li>11. Education: resolving some questions, with intent to contain mistakes and make the students extracted error</li> <li>12. Learning: asking questions and inquiries and making the student turn into a teaching explanation and solution on the blackboard at that point,</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                              |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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|  | <p>brainstorming method</p> <p>13. Learning: questions directly and consequently all students to learn the extent of interaction and the rest to be paid attention to</p> <p>14. Learning: Each specific group and explain its interaction between students with questions and answers and provide an environment that enables the student to lecture management or debate.</p> <p>15. Instructors can use slides, diagrams, and other visual aids to help students understand complex topics.</p> <p>16. Online resources: Online resources such as interactive tutorials, video lectures, and online forums can supplement classroom instruction and provide students with additional opportunities to learn image processing.</p> <p>17. Assessments: Assessments can help students measure their understanding of course material and provide instructors with feedback on the effectiveness of their teaching. Assessments can include quizzes, exams, and projects. By using a combination of these learning and teaching strategies, instructors can create a dynamic and engaging learning environment that helps students develop the knowledge and skills they need to succeed in the field of digital image processing.</p> |
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**Student Workload (SWL) الحمل**  
الدراسي للطلاب محسوب لـ ١٥ اسبوعا

|                                                                                  |            |                                                                             |  |
|----------------------------------------------------------------------------------|------------|-----------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem) الحمل</b><br>الدراسي المنتظم للطلاب خلال الفصل         |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطلاب أسبوعيا         |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي الغير المنتظم للطلاب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي الغير المنتظم للطلاب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي للطلاب خلال الفصل                      | <b>200</b> |                                                                             |  |

**Module Evaluation**

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

| <b>Delivery Plan (Weekly Syllabus)</b><br>المنهاج الاسبوعي النظري |                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                   | <b>Material Covered</b>                                                                                                                                                                                                                     |
| <b>Week 1</b>                                                     | Introduction and Digital Image Fundamentals: The origins of Digital Image Processing. Examples of Fields that Use Digital Image Processing. Fundamentals Steps in Image Processing. Elements of Digital Image Processing.                   |
| <b>Week 2</b>                                                     | Introduction And Digital Image Fundamentals : Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels. Translation, Scaling, Rotation and Perspective Projection of image |
| <b>Week 3</b>                                                     | Introduction And Digital Image Fundamentals: Linear and Non-Linear Operations • Digital image Representation. Reading, Displaying, Writing Images using MATLAB. Data Classes, Image Types using MATLAB                                      |
| <b>Week 4</b>                                                     | Digital image Representation: Converting Between data classes and Image Types. Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations. Histogram Processing                                                         |
| <b>Week 5</b>                                                     | Image Enhancement in the Spatial Domain: Enhancement Using Arithmetic and Logic operations Combining Spatial Enhancement Methods. Basics of Spatial Filters                                                                                 |
| <b>Week 6</b>                                                     | Image Enhancement in the Spatial Domain: Smoothing and Sharpening Spatial Filters.                                                                                                                                                          |
| <b>Week 7</b>                                                     | Image Enhancement in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain. Computing and visualizing the 2D DFT.                                                                                                |
| <b>Week 8</b>                                                     | Convolution and correlation. Image Enhancement in the Frequency Domain: Smoothing Frequency Domain Filters                                                                                                                                  |
| <b>Week 9</b>                                                     | Image Enhancement in the Frequency Domain: Sharpening Frequency Domain Filters. Homomorphic Filtering. Wavelet Transform. Haar Transform.                                                                                                   |
| <b>Week 10</b>                                                    | Image Restoration: A model of The Image Degradation / Restoration Process. Noise Models. Restoration in the presence of Noise Only Spatial Filtering.                                                                                       |
| <b>Week 11</b>                                                    | Image Restoration: Periodic Noise Reduction by Frequency Domain Filtering. Linear Position-Invariant Degradations. Estimation of Degradation Function.                                                                                      |
| <b>Week 12</b>                                                    | Image Restoration: Inverse filtering. Wiener filtering                                                                                                                                                                                      |
| <b>Week 13</b>                                                    | Image Restoration: Geometric Mean Filter. Geometric Transformations.                                                                                                                                                                        |
| <b>Week 14</b>                                                    | Object Recognition: Patterns and Pattern Classes. Decision-Theoretic Methods. Structural Methods                                                                                                                                            |
| <b>Week 15</b>                                                    | Course review, final project presentations, and exam preparation.                                                                                                                                                                           |
| <b>Week 16</b>                                                    | <b>Preparatory week before the final Exam</b>                                                                                                                                                                                               |
|                                                                   | <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي للمختبرات                                                                                                                                                                   |
|                                                                   |                                                                                                                                                                                                                                             |

|                | <b>Material Covered</b>                                           |
|----------------|-------------------------------------------------------------------|
| <b>Week 1</b>  | Image reading and Printing.                                       |
| <b>Week 2</b>  | Reducing the Number of Intensity Levels in an Image.              |
| <b>Week 3</b>  | Zooming and Shrinking Images by Pixel Replication.                |
| <b>Week 4</b>  | Zooming and Shrinking Images by Bilinear Interpolation.           |
| <b>Week 5</b>  | Arithmetic Operations.                                            |
| <b>Week 6</b>  | Image Enhancement Using Intensity Transformations.                |
| <b>Week 7</b>  | Histogram Equalization.                                           |
| <b>Week 8</b>  | Spatial Filtering.                                                |
| <b>Week 9</b>  | Enhancement Using the Laplacian.                                  |
| <b>Week 10</b> | Unsharp Masking.                                                  |
| <b>Week 11</b> | Convolution and correlation                                       |
| <b>Week 12</b> | Degradation model                                                 |
| <b>Week 13</b> | Image Restoration using different filters                         |
| <b>Week 14</b> | Image Restoration using different filters                         |
| <b>Week 15</b> | Course review, final project presentations, and exam preparation. |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                     |

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Available in the Library?</b> |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>Required Texts</b> | <p>Here are some required texts for a course on digital image processing:</p> <ol style="list-style-type: none"> <li>1. Digital Image Processing, Second Edition by Rafael C. Gonzalez and Richard E. Woods, Pearson Education</li> <li>2. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI 2.</li> <li>3. Fundamentals of Digital Image Processing by Anil K Jain, PHI</li> <li>4. Digital Image Processing Using Matlab, Rafael C. Gonzalez and Richard E. Woods, Pearson Education.</li> </ol> | No                               |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |
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| <b>Recommended Texts</b> | <p>Here are some recommended texts for a course on digital image processing:</p> <ol style="list-style-type: none"> <li>Al Bovik (ed.), "Handbook of Image and Video Processing", Academic Press, 2000.</li> <li>A.K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall, Addison-Wesley, 1989.</li> <li>M. Petrou, P. Bosdogianni, "Image Processing, The Fundamentals", Wiley, 1999.</li> <li>P.Ramesh Babu, Digital Image Processing. Scitech Publications., 2003.</li> <li>Bernd Jähne, Digital Image Processing, Springer-Verlag Berlin Heidelberg 2005.</li> <li>B. Jähne, "Practical Handbook on Image Processing for Scientific Applications", CRC Press, 1997.</li> <li>J. C. Russ. The Image Processing Handbook. CRC, Boca Raton, FL, 4th edn., 2002.</li> <li>J. S. Lim, "Two-dimensional Signal and Image Processing" Prentice-Hall, 1990.</li> <li>Rudra Pratap, Getting Started With MATLAB 7. Oxford University Press, 2006</li> <li>W. K. Pratt. Digital image processing, PIKS Inside. Wiley, New York, 3rd, edn., 2001.</li> <li>Stephane Marchand-Maillet, Yazid M. Sharaiha, Binary Digital Image Processing, A Discrete Approach, Academic Press, 2000.</li> </ol> | No |
| <b>Websites</b>          | <ol style="list-style-type: none"> <li>www.imageprocessingplace.com (required). Text book website)</li> <li>www.mathworks.com (MATLAB documentation)</li> <li>en.wikipedia.org/wiki/Digital_image_processing (General image processing concepts)</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |

### Grading Scheme

مخطط الدرجات

| Group                           | Grade                   | التقدير               | Marks %  | Definition                            |
|---------------------------------|-------------------------|-----------------------|----------|---------------------------------------|
| <b>Success Group (50 - 100)</b> | <b>A</b> - Excellent    | امتياز                | 90 - 100 | Outstanding Performance               |
|                                 | <b>B</b> - Very Good    | جيد جدا               | 80 - 89  | Above average with some errors        |
|                                 | <b>C</b> - Good         | جيد                   | 70 - 79  | Sound work with notable errors        |
|                                 | <b>D</b> - Satisfactory | متوسط                 | 60 - 69  | Fair but with major shortcomings      |
|                                 | <b>E</b> - Sufficient   | مقبول                 | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group (0 - 49)</b>      | <b>FX</b> – Fail        | راسب ( قيد المعالجة ) | (45-49)  | More work required but credit awarded |
|                                 | <b>F</b> – Fail         | راسب                  | (0-44)   | Considerable amount of work required  |
|                                 |                         |                       |          |                                       |

### Module Information

| معلومات المادة الدراسية            |                      |                               |                                                                                                                                                                                                                                                     |        |
|------------------------------------|----------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Module Title                       | <b>Hydrology</b>     |                               | Module Delivery                                                                                                                                                                                                                                     |        |
| Module Type                        | C                    |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |        |
| Module Code                        | RSGIS24016           |                               |                                                                                                                                                                                                                                                     |        |
| ECTS Credits                       | 3                    |                               |                                                                                                                                                                                                                                                     |        |
| SWL (hr/sem)                       | 75                   |                               |                                                                                                                                                                                                                                                     |        |
| Module Level                       | UGII                 | Semester of Delivery          |                                                                                                                                                                                                                                                     |        |
| Administering Department           | Type Dept. Code      | College                       | Type College Code                                                                                                                                                                                                                                   |        |
| Module Leader                      | عبيد نزار عبد الحميد |                               | e-mail                                                                                                                                                                                                                                              |        |
| Module Leader's Acad. Title        | مدرس                 | Module Leader's Qualification | Msc                                                                                                                                                                                                                                                 |        |
| Module Tutor                       | Name (if available)  |                               | e-mail                                                                                                                                                                                                                                              | E-mail |
| Peer Reviewer Name                 | Name                 |                               | e-mail                                                                                                                                                                                                                                              | E-mail |
| Scientific Committee Approval Date | 10/3/2026            |                               | Version Number                                                                                                                                                                                                                                      | 1.0    |

| Relation with other Modules       |      |          |  |
|-----------------------------------|------|----------|--|
| العلاقة مع المواد الدراسية الأخرى |      |          |  |
| Prerequisite module               | None | Semester |  |
| Co-requisites module              | None | Semester |  |

| Module Aims, Learning Outcomes and Indicative Contents   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Module Objectives</b><br>أهداف المادة الدراسية        | <ol style="list-style-type: none"> <li>1. Understand the hydrological cycle and the processes that drive it.</li> <li>2. Describe the different types of precipitation and their measurement methods.</li> <li>3. Explain the factors that affect evapotranspiration and the techniques used to estimate it.</li> <li>4. Understand infiltration processes and soil water properties, and describe water movement in soils.</li> <li>5. Describe groundwater properties, aquifer types, and groundwater flow.</li> <li>6. Understand surface water properties, streamflow measurement, and streamflow hydrographs.</li> <li>7. Explain hydrologic routing methods and flood routing.</li> <li>8. Understand snow accumulation and melt processes, snow water equivalent, and snowmelt modeling.</li> <li>9. Describe water quality parameters, sources of pollution, and water quality modeling.</li> <li>10. Understand watershed characteristics, watershed modeling, and water resources planning.</li> <li>11. Develop an understanding of water resources planning and management, water allocation, and water conservation.</li> </ol> |

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|                                                                  | 12. Understand the impacts of climate change on hydrology, adaptation strategies, and mitigation measures.<br>13. Develop conceptual and physical models for hydrological modeling and understand model calibration and validation.<br>14. Apply GIS applications in hydrology, spatial analysis, and modeling.<br>15. Interpret remote sensing data for hydrology, including image interpretation and classification techniques.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | 1. Describe the hydrological cycle and its components, including precipitation, evapotranspiration, infiltration, groundwater, and surface water hydrology.<br>2. Analyze and interpret different types of precipitation data and understand their measurement methods.<br>3. Demonstrate an understanding of evapotranspiration processes, including the factors that affect it and the techniques used to estimate it.<br>4. Analyze soil water properties and water movement in soils, including infiltration processes.<br>5. Evaluate groundwater properties, aquifer types, and groundwater flow and understand their role in the hydrological cycle.<br>6. Analyze surface water properties, streamflow measurement, and streamflow hydrographs.<br>7. Apply hydrologic routing methods and understand flood routing.<br>8. Develop models for snow accumulation and melt processes, snow water equivalent, and snowmelt modeling.<br>9. Evaluate water quality parameters, sources of pollution, and water quality modeling techniques.<br>10. Apply watershed modeling techniques and understand water resources planning.<br>11. Evaluate water resources planning and management strategies, including water allocation and conservation.<br>12. Evaluate the impacts of climate change on hydrology and develop adaptation and mitigation strategies.<br>13. Develop and apply conceptual and physical models for hydrological modeling and understand model calibration and validation.<br>14. Apply GIS applications in hydrology, including spatial analysis and modeling.<br>15. Analyze remote sensing data for hydrology, including image interpretation and classification techniques |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | 1. Introduction to Hydrology<br>- Overview of hydrology<br>- Key concepts and terminology<br>- Hydrological cycle<br>- Water balance<br><br>2. Precipitation<br>- Types of precipitation<br>- Measurement methods for precipitation<br>- Spatial and temporal variability of precipitation<br><br>3. Evapotranspiration<br>- Measurement methods for evapotranspiration<br>- Factors affecting evapotranspiration<br>- Techniques used to estimate evapotranspiration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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|  | <p>4. Infiltration and Soil Water</p> <ul style="list-style-type: none"> <li>- Infiltration processes</li> <li>- Soil water properties</li> <li>- Water movement in soils</li> </ul> <p>5. Groundwater</p> <ul style="list-style-type: none"> <li>- Groundwater properties</li> <li>- Aquifer types</li> <li>- Groundwater flow</li> </ul> <p>6. Surface Water Hydrology</p> <ul style="list-style-type: none"> <li>- Surface water properties</li> <li>- Streamflow measurement</li> <li>- Streamflow hydrographs</li> </ul> <p>7. Hydrologic Routing</p> <ul style="list-style-type: none"> <li>- Routing methods</li> <li>- Hydrologic models</li> <li>- Flood routing</li> </ul> <p>8. Snow Hydrology</p> <ul style="list-style-type: none"> <li>- Snow accumulation and melt processes</li> <li>- Snow water equivalent</li> <li>- Snowmelt modeling</li> </ul> <p>9. Water Quality</p> <ul style="list-style-type: none"> <li>- Water quality parameters</li> <li>- Sources of pollution</li> <li>- Water quality modeling</li> </ul> <p>10. Watershed Hydrology</p> <ul style="list-style-type: none"> <li>- Watershed characteristics</li> <li>- Watershed modeling</li> <li>- Water resources planning</li> </ul> <p>11. Water Resources Management</p> <ul style="list-style-type: none"> <li>- Water resources planning and management</li> <li>- Water allocation</li> <li>- Water conservation</li> </ul> <p>12. Climate Change and Hydrology</p> <ul style="list-style-type: none"> <li>- Impacts of climate change on hydrology</li> <li>- Adaptation strategies</li> <li>- Mitigation measures</li> </ul> <p>13. Hydrological Modeling</p> <ul style="list-style-type: none"> <li>- Conceptual and physical models</li> <li>- Model calibration and validation</li> </ul> |
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|  | <p>14. GIS in Hydrology</p> <ul style="list-style-type: none"> <li>- GIS applications in hydrology</li> <li>- Spatial analysis</li> <li>- Modeling</li> </ul> <p>15. Remote Sensing in Hydrology</p> <ul style="list-style-type: none"> <li>- Remote sensing data for hydrology</li> <li>- Image interpretation</li> <li>- Classification techniques</li> </ul> <p>16. Review and Assessment</p> <ul style="list-style-type: none"> <li>- Review of course material</li> <li>- Assessment of learning outcomes.</li> </ul> |
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## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strategies | <ol style="list-style-type: none"> <li>1. Lectures: Lectures can be used to introduce key concepts and theories related to hydrology. Lectures can be delivered in person or online and can include multimedia materials and real-world case studies.</li> <li>2. Discussions: Discussions can be used to encourage students to reflect on hydrological concepts and to share their own experiences and insights. Discussions can be facilitated in person or online and can be structured as small group discussions or as whole-class discussions.</li> <li>3. Problem-based learning: Problem-based learning can be used to encourage students to apply hydrological concepts to real-world problems. Students can work in groups to solve problems related to hydrology and present their solutions to the class.</li> <li>4. Field trips: Field trips can be used to give students hands-on experience with hydrological concepts. Field trips can include visits to watersheds, groundwater wells, and monitoring stations.</li> <li>5. Laboratory exercises: Laboratory exercises can be used to give students hands-on experience with hydrological concepts. Laboratory exercises can include experiments related to precipitation, evapotranspiration, infiltration, and groundwater flow.</li> <li>6. Computer simulations: Computer simulations can be used to model hydrological processes and to help students understand complex hydrological concepts. Simulations can be used to model surface water hydrology, groundwater flow, and water quality.</li> <li>7. Assignments: Assignments can be used to assess students' understanding of hydrological concepts. Assignments can include problem sets, case studies, and research papers.</li> <li>8. Group projects: Group projects can be used to encourage collaboration and teamwork among students. Group projects can include watershed modeling or water resources planning projects.</li> <li>9. Guest lectures: Guest lectures can be used to bring in experts from industry or academia to share their experiences and insights related to hydrology.</li> <li>10. Online resources: Online resources such as videos, online lectures, and interactive simulations can be used to supplement in-class instruction and to provide students with additional learning opportunities.</li> </ol> |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| <b>Student Workload (SWL)</b><br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا       |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>200</b> |                                                                           |  |

| <b>Module Evaluation</b><br>تقييم المادة الدراسية |                        |             |                  |            |                           |
|---------------------------------------------------|------------------------|-------------|------------------|------------|---------------------------|
|                                                   |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
| <b>Formative assessment</b>                       | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                                                   | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                                                   | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                                                   | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b>                       | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                                                   | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>                           |                        |             | 100% (100 Marks) |            |                           |

| <b>Delivery Plan (Weekly Syllabus)</b><br>المنهاج الاسبوعي النظري |                                                                                                                        |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
|                                                                   | Material Covered                                                                                                       |
| <b>Week 1</b>                                                     | Introduction to Hydrology - Overview, key concepts and terminology, hydrological cycle, and water balance.             |
| <b>Week 2</b>                                                     | Precipitation - Types of precipitation, measurement methods, and spatial and temporal variability.                     |
| <b>Week 3</b>                                                     | Evapotranspiration - Measurement methods, estimation techniques, and factors affecting evapotranspiration.             |
| <b>Week 4</b>                                                     | Infiltration and Soil Water - Infiltration processes, soil water properties, and water movement in soils.              |
| <b>Week 5</b>                                                     | Groundwater - Groundwater properties, aquifer types, and groundwater flow.                                             |
| <b>Week 6</b>                                                     | Surface Water Hydrology - Surface water properties, streamflow measurement, and streamflow hydrographs.                |
| <b>Week 7</b>                                                     | Hydrologic Routing - Routing methods, hydrologic models, and flood routing.                                            |
| <b>Week 8</b>                                                     | Snow Hydrology - Snow accumulation and melt processes, snow water equivalent, and snowmelt modeling.                   |
| <b>Week 9</b>                                                     | Water Quality - Water quality parameters, sources of pollution, and water quality modeling.                            |
| <b>Week 10</b>                                                    | Watershed Hydrology - Watershed characteristics, watershed modeling, and water resources planning.                     |
| <b>Week 11</b>                                                    | Water Resources Management - Water resources planning and management, water allocation, and water conservation.        |
| <b>Week 12</b>                                                    | Climate Change and Hydrology - Impacts of climate change on hydrology, adaptation strategies, and mitigation measures. |

|                |                                                                                                                       |
|----------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Week 13</b> | Hydrological Modeling - Conceptual and physical models, model calibration, and validation.                            |
| <b>Week 14</b> | GIS in Hydrology - GIS applications in hydrology - Spatial analysis - Modeling                                        |
| <b>Week 15</b> | Remote Sensing in Hydrology - Remote sensing data for hydrology, image interpretation, and classification techniques. |
| <b>Week 16</b> | Review and Assessment<br>- Review of course material<br>- Assessment of learning outcomes.                            |

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

|                | Material Covered                       |
|----------------|----------------------------------------|
| <b>Week 16</b> | Preparatory week before the final Exam |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                       | Text                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Available in the Library? |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b> | <ol style="list-style-type: none"> <li>"Applied Hydrology" by Ven Chow, David Maidment, and Larry Mays (McGraw Hill Education, 1988)<br/>This text provides an introduction to hydrological concepts and covers topics such as precipitation, evapotranspiration, infiltration, and groundwater.</li> <li>"Hydrology and Floodplain Analysis" by Philip B. Bedient, Wayne C. Huber, and Baxter E. Vieux (Pearson, 2013)<br/>This text covers topics such as surface water hydrology, watershed modeling, and floodplain analysis.</li> <li>"Groundwater Hydrology" by David Keith Todd and Larry W. Mays (Wiley, 2005)<br/>This text provides an in-depth coverage of groundwater hydrology, including groundwater properties, aquifer types, and groundwater flow.</li> <li>"Water Resources Engineering" by Larry W. Mays (Wiley, 2010)<br/>This text covers topics such as water resources planning and management, water allocation, and water conservation.</li> <li>"GIS and Geocomputation for Water Resource Science and Engineering" by Barnali Dixon and Venkatesh Uddameri (Wiley, 2016)<br/>This text covers the use of GIS in hydrology, including spatial analysis and modeling.</li> </ol> | No                        |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Recommended Texts | <ol style="list-style-type: none"> <li>1. "Introduction to Hydrology" by Warren Viessman Jr. and Gary L. Lewis (Pearson, 2003)<br/>This text provides an introduction to hydrological concepts and covers topics such as precipitation, evapotranspiration, infiltration, and groundwater.</li> <li>2. "Principles of Snow Hydrology" by David R. DeWalle and Albert Rango (Cambridge University Press, 2008)<br/>This text covers topics such as snow accumulation and melt processes, snow water equivalent, and snowmelt modeling.</li> <li>3. "Handbook of Applied Hydrology" edited by Ven Chow (McGraw Hill Education, 1989)<br/>This comprehensive text covers a wide range of topics in hydrology, including surface water hydrology, groundwater hydrology, and water quality.</li> <li>4. "Hydrology: An Introduction" by Wilfried Brutsaert (Cambridge University Press, 2005)<br/>This text provides an introduction to hydrological concepts and covers topics such as precipitation, evapotranspiration, infiltration, and groundwater.</li> <li>5. "Groundwater in Geologic Processes" by Steven M. Gorelick and Richard L. Bras (Cambridge University Press, 2003)<br/>This text covers topics related to groundwater geology, including groundwater recharge, subsurface flow, and groundwater-surface water interactions.</li> <li>6. "Water Resources Systems Planning and Management" by S. P. Simonovic (CRC Press, 2002)<br/>This text covers topics related to water resources planning and management, including water allocation, water supply, and water demand management.</li> </ol>                                                                                                                                                                                                                                                                                                                   | No |
| Websites          | <ol style="list-style-type: none"> <li>1. USGS Water Resources - Provides access to extensive data on water resources in the United States, including streamflow and groundwater data, water quality data, and water-use data. (<a href="https://water.usgs.gov">https://water.usgs.gov</a>)</li> <li>2. National Weather Service - Provides access to weather forecasts, severe weather alerts, and climate data. (<a href="https://www.weather.gov">https://www.weather.gov</a>)</li> <li>3. Global Runoff Data Centre - Provides access to global runoff data, including long-term runoff data and data on extreme events. (<a href="https://www.bafg.de/GRDC/EN/Home/homepage_node.html">https://www.bafg.de/GRDC/EN/Home/homepage_node.html</a>)</li> <li>4. National Oceanic and Atmospheric Administration - Provides access to data on oceanic and atmospheric conditions, including sea surface temperature, ocean currents, and atmospheric circulation. (<a href="https://www.noaa.gov">https://www.noaa.gov</a>)</li> <li>5. World Meteorological Organization - Provides access to global weather and climate data, including historical climate data and climate change information. (<a href="https://public.wmo.int/en">https://public.wmo.int/en</a>)</li> <li>6. Hydrology Research Group at the University of Saskatchewan - Provides access to research publications and resources related to hydrology, including snow hydrology, groundwater, and water quality. (<a href="https://www.usask.ca/hydrology/">https://www.usask.ca/hydrology/</a>)</li> <li>7. Hydrology and Water Resources at the University of Arizona - Provides access to research publications and resources related to hydrology and water resources, including surface water hydrology, groundwater, and water resources planning and management. (<a href="https://www.hwr.arizona.edu/">https://www.hwr.arizona.edu/</a>)</li> </ol> |    |

### Grading Scheme

مخطط الدرجات

| Group | Grade | التقدير | Marks % | Definition |
|-------|-------|---------|---------|------------|
|-------|-------|---------|---------|------------|

|                                     |                         |                     |          |                                       |
|-------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group<br/>(50 - 100)</b> | <b>A - Excellent</b>    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                     | <b>B - Very Good</b>    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                     | <b>C - Good</b>         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                     | <b>D - Satisfactory</b> | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                     | <b>E - Sufficient</b>   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group<br/>(0 – 49)</b>      | <b>FX – Fail</b>        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                     | <b>F – Fail</b>         | راسب                | (0-44)   | Considerable amount of work required  |
|                                     |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

| Module Information                 |                                   |  |                               |                                                                                                                                                                                                                                                     |  |
|------------------------------------|-----------------------------------|--|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| معلومات المادة الدراسية            |                                   |  |                               |                                                                                                                                                                                                                                                     |  |
| Module Title                       | Remote Sensing software packages  |  |                               | Module Delivery                                                                                                                                                                                                                                     |  |
| Module Type                        | C                                 |  |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |  |
| Module Code                        | RSGIS24017                        |  |                               |                                                                                                                                                                                                                                                     |  |
| ECTS Credits                       | 4                                 |  |                               |                                                                                                                                                                                                                                                     |  |
| SWL (hr/sem)                       | 100                               |  |                               |                                                                                                                                                                                                                                                     |  |
| Module Level                       | UGII                              |  | Semester of Delivery          |                                                                                                                                                                                                                                                     |  |
| Administering Department           | Remote sensing and GIS department |  | College                       | college of science                                                                                                                                                                                                                                  |  |
| Module Leader                      |                                   |  | e-mail                        |                                                                                                                                                                                                                                                     |  |
| Module Leader's Acad. Title        |                                   |  | Module Leader's Qualification | Master                                                                                                                                                                                                                                              |  |
| Module Tutor                       | Name (if available)               |  | e-mail                        | E-mail                                                                                                                                                                                                                                              |  |
| Peer Reviewer Name                 | Name                              |  | e-mail                        | E-mail                                                                                                                                                                                                                                              |  |
| Scientific Committee Approval Date | 1/10/2025                         |  | Version Number                | 1.0                                                                                                                                                                                                                                                 |  |
| Relation with other Modules        |                                   |  |                               |                                                                                                                                                                                                                                                     |  |
| العلاقة مع المواد الدراسية الأخرى  |                                   |  |                               |                                                                                                                                                                                                                                                     |  |
| Prerequisite module                | None                              |  |                               | Semester                                                                                                                                                                                                                                            |  |
| Co-requisites module               | None                              |  |                               | Semester                                                                                                                                                                                                                                            |  |

| <b>Module Aims, Learning Outcomes and Indicative Contents</b><br><b>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br><b>أهداف المادة الدراسية</b>                                                                         | <ol style="list-style-type: none"> <li>1. Understand the fundamental concepts of remote sensing and satellite image analysis. This includes knowledge of image processing techniques, spectral bands, data formats, coordinate systems, etc.</li> <li>2. Get familiarity with major remote sensing software packages like ERDAS Imagine, ENVI, QGIS, ArcGIS, SNAP, etc. Learn how to install, navigate and perform basic tasks in these software.</li> <li>3. Learn to process and analyze satellite imagery using the software. This includes tasks like image visualization, enhancement, classification, change detection, mosaicing, etc.</li> <li>4. Understand how to access and download satellite imagery from sources like USGS, Landsat, Copernicus, NASA, etc and prepare the data for analysis.</li> <li>5. Be able to interpret and map results from image analysis using the software. This includes producing thematic maps, probability maps, land cover maps, land use maps, etc.</li> <li>6. Apply remote sensing techniques and software to solve real world problems and case studies related to land use planning, natural resource management, environmental monitoring, etc.</li> <li>7. Develop skills to automate repetitive tasks using scripting languages like Python in combination with the software for efficient large scale analysis.</li> </ol> <p>The main focus of the course would be on providing hands-on training and practical exercises to develop key skills for analyzing remote sensing data using popular software tools. The theoretical concepts and case studies would help illustrate real life applications of the techniques learned.</p>                                                                                                                                                                                                                        |
| <b>Module Learning Outcomes</b><br><b>مخرجات التعلم للمادة الدراسية</b>                                                          | <ol style="list-style-type: none"> <li>1. Students will be able to install, navigate and execute basic commands in major remote sensing software packages like ERDAS Imagine, ENVI, QGIS, ArcGIS, SNAP, etc.</li> <li>2. Students will be able to visualize, manipulate and analyze satellite imagery and remote sensing data using different software tools. This includes tasks like pseudo coloring, image enhancement, band math, spectral interpretation, image classification, etc.</li> <li>3. Students will be able to access and download satellite imagery from sources like USGS, Landsat, Copernicus, NASA and prepare them for analysis in the software.</li> <li>4. Students will be able to produce thematic maps, land cover maps, probability maps and other geospatial outputs from satellite image analysis using the software.</li> <li>5. Students will be able to apply knowledge of remote sensing software packages to solve real world problems like land use mapping, natural resource management, environmental monitoring, change detection, etc.</li> <li>6. Students will be able to automate repetitive tasks in the software using Python or other scripting languages to improve efficiency of large scale analysis.</li> <li>7. Students will understand the limitations and strengths of different software packages for specific remote sensing and GIS applications.</li> <li>8. Students will develop the ability to interpret and evaluate results from satellite image analysis using remote sensing software packages.</li> </ol> <p>In summary, the main focus of learning outcomes for this course would be on developing practical skills for processing, analyzing and interpreting remote sensing data using software, as well applying the techniques to solve geospatial problems. The automation of tasks would also be an important component of the outcomes.</p> |
| <b>Indicative</b>                                                                                                                | 1. Introduction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

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|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Contents</b><br>المحتويات<br>الإرشادية | <ul style="list-style-type: none"> <li>- What is remote sensing?</li> <li>- Types of remote sensing data</li> <li>- Brief history and applications</li> <li>- Overview of software packages</li> </ul> <p>2. Important Concepts</p> <ul style="list-style-type: none"> <li>- Image coordinates and projections</li> <li>- Image geometry and anomalies</li> <li>- Spectral bands and indices</li> <li>- Image formats and file types</li> </ul> <p>3. Software Introduction</p> <ul style="list-style-type: none"> <li>- Demonstrations of major packages like ERDAS Imagine, ENVI, QGIS, ArcGIS, etc</li> <li>- Interface, tools, functionality of each software</li> <li>- Pros and cons for different applications</li> </ul> <p>4. Data Access and Preparation</p> <ul style="list-style-type: none"> <li>- Sources of satellite data</li> <li>- Downloading and preparing data for analysis</li> <li>- Rectification, subsetting, layer stacking, etc.</li> </ul> <p>5. Image visualization</p> <ul style="list-style-type: none"> <li>- RGB composite color images</li> <li>- Histogram stretching</li> <li>- Filtering and enhancement techniques</li> </ul> <p>6. Image Classification</p> <ul style="list-style-type: none"> <li>- Supervised and unsupervised methods</li> <li>- Accuracy assessment</li> <li>- Thematic map production</li> </ul> <p>7. Change Detection</p> <ul style="list-style-type: none"> <li>- Image differencing</li> <li>- Change vector analysis</li> <li>- Post-classification comparison</li> </ul> <p>8. Mapping and Reporting</p> <ul style="list-style-type: none"> <li>- Producing maps, tables and reports from results</li> <li>- Statistical analysis of geospatial data</li> </ul> <p>9. Automation Using Python/Scripting</p> <ul style="list-style-type: none"> <li>- Automating repetitive tasks</li> <li>- Handling large volumes of data efficiently</li> </ul> <p>10. Applications</p> <ul style="list-style-type: none"> <li>- Case studies for land use mapping, crop monitoring, disaster monitoring, urban planning, etc.</li> </ul> <p>The course would likely spend around 2/3 of content/time on hands-on practical sessions and 1/3 on theoretical foundations and real-world applications. The main software</p> |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|  |                                                                                                                                                                                |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | demonstrations and exercises would be distributed across the relevant topics to provide an integrated learning experience.                                                     |
|  | The key is to focus on developing essential job-ready skills while also anchoring those skills in an understanding of fundamental principles and application to real problems. |

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <ol style="list-style-type: none"> <li>1. Hands-on lab sessions: The majority of the course time should be spent doing practical exercises and labs on the software. This is the best way for students to develop and demonstrate the core skills. The labs can cover topics like image pre-processing, image enhancement, classification, mapping, scripting, etc.</li> <li>2. Lectures: Short lectures can be used to introduce key concepts, techniques and software tools. Lectures should focus on the essential theoretical background needed to understand and apply the skills in the labs.</li> <li>3. Real-world case studies: Case studies on applying remote sensing software to solve real problems can be used to illustrate practical applications of the techniques. Students can discuss and analyze the case studies.</li> <li>4. Student projects: Assigning students a mini-project to apply what they have learned to a real-world problem can help consolidate their skills. Students can work individually or in small groups on the projects.</li> <li>5. Software demonstrations: Demonstrating key functions of the software and giving students hands-on practice during lectures and labs can increase engagement and learning.</li> <li>6. Recordings: Recording lectures and lab sessions can allow students to review concepts and refer back to demonstrations. This is especially useful for complex tasks.</li> <li>7. Discussion forums: Online discussion forums can allow students to ask questions, discuss assignments, and help each other. This promotes collaborative learning.</li> <li>8. Scripting templates: Providing Python or other scripting templates/examples can get students started with automating tasks in the software. They can then customize the scripts for their own needs.</li> <li>9. Student presentations: Having students present their project findings and maps to the class can help develop their communication skills. Peer feedback can also improve their work.</li> <li>10. An emphasis on active and experiential learning strategies like hands-on labs, projects and real-world applications, combined with lecture-based instruction of foundational concepts, would likely be most effective for a remote sensing software packages course.</li> </ol> |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

#### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>200</b> |                                                                           |  |

## Module Evaluation

تقييم المادة الدراسية

|                      |                 | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|----------------------|-----------------|-------------|------------------|------------|---------------------------|
| Formative assessment | Quizzes         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                      | Assignments     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                      | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                      | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| Summative assessment | Midterm Exam    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                      | Final Exam      | 3hr         | 50% (50)         | 16         | All                       |
| Total assessment     |                 |             | 100% (100 Marks) |            |                           |

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|        | Material Covered                                                                                                                                                                                                             |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Week 1 | : Introduction to Remote Sensing and Software Packages<br>- Overview of remote sensing and its applications<br>- Introduction to different remote sensing software packages<br>- Installation and setup of software packages |
| Week 2 | Image Processing Basics<br>- Image enhancement techniques<br>- Spatial and spectral resolution<br>- Image classification techniques                                                                                          |
| Week 3 | Image Processing with ENVI<br>- Introduction to ENVI software<br>- Importing, viewing, and manipulating images<br>- Spectral analysis and image enhancement in ENVI                                                          |
| Week 4 | Image Processing with ArcGIS<br>- Introduction to ArcGIS software<br>- Importing and processing remote sensing data in ArcGIS<br>- Georeferencing and image rectification                                                    |
| Week 5 | Image Processing with QGIS<br>- Introduction to QGIS software<br>- Importing and processing remote sensing data in QGIS<br>- Creating and editing vector data                                                                |
| Week 6 | Radar Remote Sensing with SARscape<br>- Introduction to SAR remote sensing<br>- Overview of SARscape software<br>- Radar image processing, analysis, and interpretation                                                      |
| Week 7 | Lidar Remote Sensing with LP360<br>- Introduction to Lidar remote sensing<br>- Overview of LP360 software<br>- Lidar data processing, analysis, and interpretation                                                           |
| Week 8 | Hyperspectral Remote Sensing with ENVI<br>- Introduction to hyperspectral remote sensing<br>- Overview of ENVI software for hyperspectral data analysis                                                                      |

|                |                                                                                                                                                                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | - Hyperspectral data processing, analysis, and interpretation                                                                                                                                                                                                          |
| <b>Week 9</b>  | : Remote Sensing Data Fusion with ERDAS Imagine<br>- Introduction to data fusion<br>- Overview of ERDAS Imagine software<br>- Image fusion techniques and applications                                                                                                 |
| <b>Week 10</b> | Remote Sensing for Land Use/Land Cover Mapping with eCognition<br>- Introduction to eCognition software<br>- Object-based image analysis for land use/land cover mapping<br>- Feature extraction and classification techniques                                         |
| <b>Week 11</b> | Remote Sensing for Vegetation Analysis with ENVI<br>- Vegetation indices and their applications<br>- Overview of ENVI software for vegetation analysis<br>- Vegetation mapping and classification techniques                                                           |
| <b>Week 12</b> | Remote Sensing for Water Resources Management with ArcGIS<br>- Overview of ArcGIS software for water resources management<br>- Hydrological modeling using remote sensing data<br>- Flood mapping and analysis                                                         |
| <b>Week 13</b> | Remote Sensing for Climate Change Studies with QGIS<br>- Overview of QGIS software for climate change studies<br>- Remote sensing for climate change impact assessment<br>- Climate change adaptation and mitigation strategies                                        |
| <b>Week 14</b> | Remote Sensing for Disaster Management with ERDAS Imagine<br>- Overview of ERDAS Imagine software for disaster management<br>- Disaster risk assessment using remote sensing data<br>- Emergency response planning and management                                      |
| <b>Week 15</b> | Remote Sensing for Urban Planning with eCognition<br>- Overview of eCognition software for urban planning<br>- Object-based image analysis for urban land use and land cover mapping<br>- Urbanization monitoring and management                                       |
| <b>Week 16</b> | Emerging Trends and Future Directions in Remote Sensing<br>- Overview of emerging trends in remote sensing<br>- Future directions in remote sensing research and development<br>- Discussion of potential applications and impact of remote sensing in various fields. |

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

|               | Material Covered                                                                                                                                                                                                                                                                                                                                                   |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b> | Introduction to Remote Sensing and Software Packages<br>- Overview of remote sensing and its applications<br>- Introduction to different remote sensing software packages<br>- Installation and setup of software packages<br><br>Lab Exercises:<br>- Installing and setting up software packages<br>- Exploring the user interface of different software packages |
| <b>Week 2</b> | : Image Processing Basics<br>- Image enhancement techniques<br>- Spatial and spectral resolution                                                                                                                                                                                                                                                                   |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <ul style="list-style-type: none"> <li>- Image classification techniques</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Image enhancement using different techniques</li> <li>- Spatial and spectral resolution analysis</li> <li>- Image classification using different techniques</li> </ul>                                                                                                                                  |
| <b>Week 3</b> | <p>Image Processing with ENVI</p> <ul style="list-style-type: none"> <li>- Introduction to ENVI software</li> <li>- Importing, viewing, and manipulating images</li> <li>- Spectral analysis and image enhancement in ENVI</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Importing and viewing images in ENVI</li> <li>- Spectral analysis and image enhancement using ENVI tools</li> </ul>                                   |
| <b>Week 4</b> | <p>Image Processing with ArcGIS</p> <ul style="list-style-type: none"> <li>- Introduction to ArcGIS software</li> <li>- Importing and processing remote sensing data in ArcGIS</li> <li>- Georeferencing and image rectification</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Importing and processing remote sensing data in ArcGIS</li> <li>- Georeferencing and image rectification using ArcGIS tools</li> </ul>          |
| <b>Week 5</b> | <p>: Image Processing with QGIS</p> <ul style="list-style-type: none"> <li>- Introduction to QGIS software</li> <li>- Importing and processing remote sensing data in QGIS</li> <li>- Creating and editing vector data</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Importing and processing remote sensing data in QGIS</li> <li>- Creating and editing vector data using QGIS tools</li> </ul>                              |
| <b>Week 6</b> | <p>Radar Remote Sensing with SARscape</p> <ul style="list-style-type: none"> <li>- Introduction to SAR remote sensing</li> <li>- Overview of SARscape software</li> <li>- Radar image processing, analysis, and interpretation</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Importing and processing radar images in SARscape</li> <li>- Radar image processing, analysis, and interpretation using SARscape tools</li> </ul> |
| <b>Week 7</b> | <p>Radar Remote Sensing with SARscape</p> <ul style="list-style-type: none"> <li>- Introduction to SAR remote sensing</li> <li>- Overview of SARscape software</li> <li>- Radar image processing, analysis, and interpretation</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Importing and processing radar images in SARscape</li> <li>- Radar image processing, analysis, and interpretation using SARscape tools</li> </ul> |
| <b>Week 8</b> | <p>Hyperspectral Remote Sensing with ENVI</p> <ul style="list-style-type: none"> <li>- Introduction to hyperspectral remote sensing</li> <li>- Overview of ENVI software for hyperspectral data analysis</li> </ul>                                                                                                                                                                                                                                        |

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <ul style="list-style-type: none"> <li>- Hyperspectral data processing, analysis, and interpretation</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Importing and processing hyperspectral data in ENVI</li> <li>- Hyperspectral data processing, analysis, and interpretation using ENVI tools</li> </ul>                                                                                                                                                                                  |
| <b>Week 9</b>  | <p>: Remote Sensing Data Fusion with ERDAS Imagine</p> <ul style="list-style-type: none"> <li>- Introduction to data fusion</li> <li>- Overview of ERDAS Imagine software</li> <li>- Image fusion techniques and applications</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Image fusion using ERDAS Imagine tools</li> <li>- Image classification using fused images</li> </ul>                                                                                                           |
| <b>Week 10</b> | <p>Remote Sensing for Land Use/Land Cover Mapping with eCognition</p> <ul style="list-style-type: none"> <li>- Introduction to eCognition software</li> <li>- Object-based image analysis for land use/land cover mapping</li> <li>- Feature extraction and classification techniques</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Object-based image analysis using eCognition tools</li> <li>- Feature extraction and classification using eCognition tools</li> </ul>                  |
| <b>Week 11</b> | <p>Remote Sensing for Vegetation Analysis with ENVI</p> <ul style="list-style-type: none"> <li>- Vegetation indices and their applications</li> <li>- Overview of ENVI software for vegetation analysis</li> <li>- Vegetation mapping and classification techniques</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Vegetation index calculation and analysis using ENVI tools</li> <li>- Vegetation mapping and classification using ENVI tools</li> </ul>                                  |
| <b>Week 12</b> | <p>Remote Sensing for Water Resources Management with ArcGIS</p> <ul style="list-style-type: none"> <li>- Overview of ArcGIS software for water resources management</li> <li>- Hydrological modeling using remote sensing data</li> <li>- Flood mapping and analysis</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Hydrological modeling using ArcGIS tools</li> <li>- Flood mapping and analysis using ArcGIS tools</li> </ul>                                                           |
| <b>Week 13</b> | <p>Remote Sensing for Climate Change Studies with QGIS</p> <ul style="list-style-type: none"> <li>- Overview of QGIS software for climate change studies</li> <li>- Remote sensing for climate change impact assessment</li> <li>- Climate change adaptation and mitigation strategies</li> </ul> <p>Lab Exercises:</p> <ul style="list-style-type: none"> <li>- Climate change impact assessment using QGIS tools</li> <li>- Climate change adaptation and mitigation strategies using remote sensing data</li> </ul> |
| <b>Week 14</b> | <p>Remote Sensing for Disaster Management with ERDAS Imagine</p> <ul style="list-style-type: none"> <li>- Overview of ERDAS Imagine software for disaster management</li> <li>- Disaster risk assessment using remote sensing data</li> <li>- Emergency response planning and management</li> </ul>                                                                                                                                                                                                                    |

|                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                            |
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|                                                          | Lab Exercises:<br>- Disaster risk assessment using ERDAS Imagine tools<br>- Emergency response planning and management using remote sensing data                                                                                                                                                                                                                                                                                                       |                            |
| Week 15                                                  | Remote Sensing for Urban Planning with eCognition<br>- Overview of eCognition software for urban planning<br>- Object-based image analysis for urban land use and land cover mapping<br>- Urbanization monitoring and management<br><br>Lab Exercises:<br>- Object-based image analysis for urban land use and land cover mapping using eCognition tools<br>- Urbanization monitoring and management using remote sensing data                         |                            |
| Week 16                                                  | Emerging Trends and Future Directions in Remote Sensing<br>- Overview of emerging trends in remote sensing<br>- Future directions in remote sensing research and development<br>- Discussion of potential applications and impact of remote sensing in various fields.<br><br>Lab Exercises:<br>- Research and analysis of emerging trends in remote sensing<br>- Discussion of potential applications and impact of remote sensing in various fields. |                            |
| Learning and Teaching Resources<br>مصادر التعلم والتدريس |                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                            |
|                                                          | Text                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Available in the Library ? |

|                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <p style="text-align: center;"><b>Required Texts</b></p>    | <ol style="list-style-type: none"> <li>1. Remote Sensing Image Analysis: Including the Spatial Domain by John A. Richards and Xiuping Jia. This book provides good overview of fundamental remote sensing image processing and analysis concepts and techniques. The chapters on basic radiometric and geometric correction, image enhancement, classification and change detection provide relevant theoretical background for the course.</li> <li>2. Object-Based Image Analysis: A Primer by Guido Barneveld. This book gives an overview of the key concepts and methods in object-based image analysis. It can serve as a concise reference for understanding object-based analysis in remote sensing software like ENVI and ERDAS Imagine.</li> <li>3. Remote Sensing Digital Image Analysis: An Introduction by John A. Richards. This book gives an excellent overview of digital image processing and analysis techniques for remote sensing. It covers theoretical concepts as well as practical approaches for application of remote sensing techniques. The chapters provide relevant background reading material for topics covered in both the lectures and labs.</li> </ol> <p>In addition to the texts, it would also be helpful to provide lab manuals/ tutorials for the hands-on exercises with ENVI and ERDAS Imagine. These could be based on sample imagery and data provided for the course. Links to online documentation and resources for the software can also be given to aid the students.</p> <p>Overall, a combination of theoretical texts, software-specific reference books and lab/tutorial manuals would provide all the necessary resources for the remote sensing software packages course. The students can refer these based on their requirements for the lectures, readings and lab sessions.</p> | <p>No</p> |
| <p style="text-align: center;"><b>Recommended Texts</b></p> | <ol style="list-style-type: none"> <li>1. Remote Sensing and Image Interpretation by Lillesand et al. - This is a comprehensive textbook that covers all the fundamental principles and techniques of remote sensing.</li> <li>2. ERDAS Field Guide by ERDAS Inc. - A hands-on guide to using ERDAS Imagine software for remote sensing applications.</li> <li>3. QGIS Map Design by Anita Graser - A practical approach to learning QGIS mapping software for GIS professionals and students.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>No</p> |

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Websites | <ul style="list-style-type: none"> <li>• Software package websites: <ul style="list-style-type: none"> <li>- ERDAS Imagine: <a href="https://hexagongeospatial.com/products/produits/erdas-imagine">https://hexagongeospatial.com/products/produits/erdas-imagine</a><br/>Provides tutorials, documentation and learning resources for ERDAS Imagine.</li> <li>- ENVI: <a href="https://www.harrisgeospatial.com/Software-Technology/ENVI.aspx">https://www.harrisgeospatial.com/Software-Technology/ENVI.aspx</a><br/>Contains user guides, tutorials and a knowledge base for ENVI software.</li> <li>- QGIS: <a href="https://www.qgistutorials.com/">https://www.qgistutorials.com/</a><br/>An excellent resource with free video tutorials and training materials for QGIS.</li> <li>- ArcGIS: <a href="https://www.esri.com/training/">https://www.esri.com/training/</a><br/>ESRI's training portal has free and paid courses, tutorials and lessons for ArcGIS.</li> </ul> </li> <li>• Data sources: <ul style="list-style-type: none"> <li>- USGS Earth Explorer: <a href="https://earthexplorer.usgs.gov/">https://earthexplorer.usgs.gov/</a><br/>Access to a wide variety of satellite imagery from USGS.</li> <li>- Copernicus Open Access Hub: <a href="https://scihub.copernicus.eu/">https://scihub.copernicus.eu/</a><br/>Download Sentinel satellite imagery for free from the European Space Agency.</li> </ul> </li> <li>• Useful tutorials and resources: <ul style="list-style-type: none"> <li>- GIS Geography: <a href="https://gisgeography.com/category/remote-sensing">https://gisgeography.com/category/remote-sensing</a><br/>Tutorials and articles on remote sensing and GIS topics.</li> <li>- GIS Lounge: <a href="https://www.gislounge.com/category/remote-sensing/">https://www.gislounge.com/category/remote-sensing/</a><br/>GIS and remote sensing blog with how-to guides, news and resources.</li> <li>- NASA Remote Sensing Tutorials: <a href="https://train.org/nasatutorial/satimage/satimage.html">https://train.org/nasatutorial/satimage/satimage.html</a><br/>Step-by-step guides from NASA on analyzing satellite imagery.</li> </ul> </li> <li>• Journal databases: <ul style="list-style-type: none"> <li>- MDPI Remote Sensing: <a href="https://www.mdpi.com/journal/remotesensing">https://www.mdpi.com/journal/remotesensing</a><br/>Open access journal with current research in remote sensing and GIS.</li> <li>- IEEE Geoscience and Remote Sensing: <a href="https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=368">https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=368</a><br/>Peer-reviewed journal publishing advances in the field.</li> </ul> </li> </ul> |
|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Grading Scheme<br>مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                       |                  |                     |          |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|----------|---------------------------------------|
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade            | التقدير             | Marks %  | Definition                            |
| Success Group<br>(50 - 100)                                                                                                                                                                                                                                                                                                                                                          | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)                                                                                                                                                                                                                                                                                                                                                               | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
| <b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |                  |                     |          |                                       |

## Module Information

معلومات المادة الدراسية

|                                                                         |                    |                                      |                                                                                                                                                                                                                                                     |  |
|-------------------------------------------------------------------------|--------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Module Title</b>                                                     | Numerical Analysis |                                      | <b>Module Delivery</b>                                                                                                                                                                                                                              |  |
| <b>Module Type</b>                                                      | B                  |                                      | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |  |
| <b>Module Code</b>                                                      | RSGIS24018         |                                      |                                                                                                                                                                                                                                                     |  |
| <b>ECTS Credits</b>                                                     | 5                  |                                      |                                                                                                                                                                                                                                                     |  |
| <b>SWL (hr/sem)</b>                                                     | 125                |                                      |                                                                                                                                                                                                                                                     |  |
| <b>Module Level</b>                                                     | UGII               | <b>Semester of Delivery</b>          |                                                                                                                                                                                                                                                     |  |
| <b>Administering Department</b>                                         |                    | <b>College</b>                       |                                                                                                                                                                                                                                                     |  |
| <b>Module Leader</b>                                                    | هالة قحطان حمدي    | <b>e-mail</b>                        |                                                                                                                                                                                                                                                     |  |
| <b>Module Leader's Acad. Title</b>                                      | مدرس               | <b>Module Leader's Qualification</b> | Ph.D.                                                                                                                                                                                                                                               |  |
| <b>Module Tutor</b>                                                     |                    | <b>e-mail</b>                        |                                                                                                                                                                                                                                                     |  |
| <b>Peer Reviewer Name</b>                                               | Name               | <b>e-mail</b>                        | E-mail                                                                                                                                                                                                                                              |  |
| <b>Scientific Committee Approval Date</b>                               | 10/3/2026          | <b>Version Number</b>                |                                                                                                                                                                                                                                                     |  |
| <b>Relation with other Modules</b><br>العلاقة مع المواد الدراسية الأخرى |                    |                                      |                                                                                                                                                                                                                                                     |  |
| <b>Prerequisite module</b>                                              | None               | <b>Semester</b>                      |                                                                                                                                                                                                                                                     |  |
| <b>Co-requisites module</b>                                             | None               | <b>Semester</b>                      |                                                                                                                                                                                                                                                     |  |

**Module Aims, Learning Outcomes and Indicative Contents**

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <ol style="list-style-type: none"> <li>Having the knowledge of the ways to solve some problems in numerical ways using computers.</li> <li>Having the knowledge of how to find the derivatives and integrations using numerical methods.</li> <li>Having the knowledge of how to solve matrix with large dimensions.</li> <li>Having the ability of interpolation to functions and how to find a function if we know only some points.</li> <li>Using numerical methods to solve integrations which have no known solutions.</li> <li>Solving some problems - making some research in Libraries and using internet.</li> </ol> |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"> <li>Solving some problems in numerical ways using computers.</li> <li>Finding the derivatives and integrations using numerical methods.</li> <li>Solving matrix with large dimensions.</li> <li>Making interpolation to functions and how to find a function if we know only some points.</li> <li>Solving integrations which have no known solutions-making.</li> <li>Search in Libraries and using internet.</li> </ol>                                                                                                                                                                   |
| <b>Indicative</b>                                                | Indicative content includes the following.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Contents</b><br>المحتويات الإرشادية | <ul style="list-style-type: none"> <li>Numerical errors</li> <li>Root finding for functions of one variable</li> <li>Root finding for functions of several variables</li> <li>Solving linear equation systems</li> <li>Interpolation by polynomials</li> <li>Numerical integration</li> <li>Numerical differentiation</li> <li>Initial value problems for ordinary differential equations</li> <li>Boundary value problems for ordinary differential equations</li> </ul> |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                       |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

#### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |  |                                                                           |  |
|--------------------------------------------------------------------------------|--|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              |  |                                                                           |  |

### Module Evaluation

#### تقييم المادة الدراسية

|                             |                      | Time/Number | Weight (Marks)   | Week Due          | Relevant Learning Outcome |
|-----------------------------|----------------------|-------------|------------------|-------------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>       | 2           | 10% (10)         | 5 and 10          | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>   | 6           | 10% (10)         | 2,3,6,8,10 and 12 | LO #3, #4 and #6, #7      |
|                             | <b>Projects /lab</b> | 1           | 10% (10)         | Continuous        | All                       |
|                             | <b>Report</b>        | 1           | 10% (10)         | 13                | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>  | 2hr         | 10% (10)         | 7                 | LO #1 - #7                |
|                             | <b>Final Exam</b>    | 3hr         | 50% (50)         | 16                | All                       |
| <b>Total assessment</b>     |                      |             | 100% (100 Marks) |                   |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|                | Material Covered                                                                                                                                             |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Basic concepts: round-off errors, floating point arithmetic, Convergence.                                                                                    |
| <b>Week 2</b>  | Numerical solution of Nonlinear Equations, Root Finding (Solving Transcending Equations) Bisection method, Steps Algorithm, Examples with Some Properties.   |
| <b>Week 3</b>  | Numerical solution of Nonlinear Equations, Root Finding (Solving Transcending Equations) Newton's method Steps Algorithm, Examples with Some Properties      |
| <b>Week 4</b>  | Secant Method Steps Algorithm, Examples with Some Properties.                                                                                                |
| <b>Week 5</b>  | false position Method Steps Algorithm, Examples with Some Properties.                                                                                        |
| <b>Week 6</b>  | Fixed Point Method Steps Algorithm, Examples with Some Properties.                                                                                           |
| <b>Week 7</b>  | Mid-term Exam                                                                                                                                                |
| <b>Week 8</b>  | System of Linear Equations : Vectors, Matrices, Linear Equations, zero matrix, identity matrix, with examples.                                               |
| <b>Week 9</b>  | System of Linear Equations : Matrix Arithmetic Operations, Determinant of a MATRICES, adding and Multiplying Matrices, with examples.                        |
| <b>Week 10</b> | Types of matrices, symmetric matrix and upper/lower triangle matrix, Augmented Matrix with examples.                                                         |
| <b>Week 11</b> | Method of Elimination: Standard and Matrix form, number of solutions, one, infinite, no solutions, Operations That Produce Equivalent Systems with examples. |
| <b>Week 12</b> | Gaussian Elimination: Forward Elimination with examples.                                                                                                     |
| <b>Week 13</b> | Gaussian Elimination: Backward Substitution with examples.                                                                                                   |
| <b>Week 14</b> | Gauss-Jordan Method: Solve system of equations by using G-J method with examples.                                                                            |
| <b>Week 15</b> | <b>Review.</b>                                                                                                                                               |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                                                                                |

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

|                | Material Covered                                                                                                                                |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Preliminaries of Computing with MatLab.                                                                                                         |
| <b>Week 2</b>  | Learning the statements ( words used in programming)                                                                                            |
| <b>Week 3</b>  | Bisection method Steps Algorithm, Examples with Some Properties in MatLab                                                                       |
| <b>Week 4</b>  | Newton's method Steps Algorithm, Examples with Some Properties in MatLab                                                                        |
| <b>Week 5</b>  | Secant Method Steps Algorithm, Examples with Some Properties in MatLab.                                                                         |
| <b>Week 6</b>  | false position Method Steps Algorithm, Examples with Some Properties in MatLab.                                                                 |
| <b>Week 7</b>  | Mid-term Exam                                                                                                                                   |
| <b>Week 8</b>  | Fixed Point Method Steps Algorithm, Examples with Some Properties in MatLab.                                                                    |
| <b>Week 9</b>  | Vectors, Matrices, Linear Equations, zero matrix, identity matrix, with examples in MatLab.                                                     |
| <b>Week 10</b> | Determinant of a MATRICES, adding and Multiplying Matrices, with examples in MatLab.                                                            |
| <b>Week 11</b> | Types of matrices, symmetric matrix and upper/lower triangle matrix, Augmented Matrix with examples in MatLab.                                  |
| <b>Week 12</b> | Standard and Matrix form, number of solutions, one, infinite, no solutions, Operations That Produce Equivalent Systems with examples in MatLab. |
| <b>Week 13</b> | Gaussian Elimination: Forward Elimination with examples in MatLab.                                                                              |
| <b>Week 14</b> | Gaussian Elimination: Backward Substitution. with examples in MatLab.                                                                           |
| <b>Week 15</b> | <b>Review.</b>                                                                                                                                  |

|         |                                        |
|---------|----------------------------------------|
| Week 16 | Preparatory week before the final Exam |
|---------|----------------------------------------|

## Learning and Teaching Resources

مصادر التعلم والتدريس

|                          | Text                                                                            | Available in the Library? |
|--------------------------|---------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | Numerical Analysis 9 <sup>th</sup> , R.L. Burden and J.D. Faires: (book). 2011. | Yes                       |
| <b>Recommended Texts</b> | An Introduction to Numerical Analysis, Endre Süli, David F. Mayers (book). 2003 | Yes                       |
| <b>Websites</b>          |                                                                                 |                           |

## Grading Scheme

مخطط الدرجات

| Group                           | Grade                   | التقدير             | Marks %  | Definition                            |
|---------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group (50 - 100)</b> | <b>A</b> - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                 | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                 | <b>C</b> - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                 | <b>D</b> - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                 | <b>E</b> - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group (0 - 49)</b>      | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                 | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                 |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

## Module Information

معلومات المادة الدراسية

|                          |                         |                 |                      |                                                                                                                                                                                                                                                                                                        |   |
|--------------------------|-------------------------|-----------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Module Title             | Arabic Language II      |                 |                      | Module Delivery                                                                                                                                                                                                                                                                                        |   |
| Module Type              | C                       |                 |                      | <div><input checked="" type="checkbox"/> Theory</div> <div><input checked="" type="checkbox"/> Lecture</div> <div><input checked="" type="checkbox"/> Lab</div> <div><input type="checkbox"/> Tutorial</div> <div><input type="checkbox"/> Practical</div> <div><input type="checkbox"/> Seminar</div> |   |
| Module Code              | UOB201                  |                 |                      |                                                                                                                                                                                                                                                                                                        |   |
| ECTS Credits             | 2                       |                 |                      |                                                                                                                                                                                                                                                                                                        |   |
| SWL (hr/sem)             | 50                      |                 |                      |                                                                                                                                                                                                                                                                                                        |   |
|                          |                         |                 |                      |                                                                                                                                                                                                                                                                                                        |   |
| Module Level             |                         | UGII            | Semester of Delivery |                                                                                                                                                                                                                                                                                                        | 4 |
| Administering Department |                         | Type Dept. Code | College              | Type College Code                                                                                                                                                                                                                                                                                      |   |
| Module Leader            | Leqaa faleh owdaa flaih |                 | e-mail               | leqaa.falih@ircoedu.uobaghdad.edu.iq                                                                                                                                                                                                                                                                   |   |

|                                           |                     |                                      |        |
|-------------------------------------------|---------------------|--------------------------------------|--------|
| <b>Module Leader's Acad. Title</b>        | Professor           | <b>Module Leader's Qualification</b> | Ph.D.  |
| <b>Module Tutor</b>                       | Name (if available) | <b>e-mail</b>                        | E-mail |
| <b>Peer Reviewer Name</b>                 | Name                | <b>e-mail</b>                        | E-mail |
| <b>Scientific Committee Approval Date</b> | 10/3/2026           | <b>Version Number</b>                | 1.0    |

| <b>Relation with other Modules</b><br>العلاقة مع المواد الدراسية الأخرى |      |                 |  |
|-------------------------------------------------------------------------|------|-----------------|--|
| <b>Prerequisite module</b>                                              | None | <b>Semester</b> |  |
| <b>Co-requisites module</b>                                             | None | <b>Semester</b> |  |

| <b>Module Aims, Learning Outcomes and Indicative Contents</b><br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                       |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                                                                         | التعريف بقواعد اللغة العربية          |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية                                                          | لغة عربية سليمة بقواعد وشعر وأدب عربي |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                                                                         |                                       |

| <b>Learning and Teaching Strategies</b><br>استراتيجيات التعلم والتعليم |  |
|------------------------------------------------------------------------|--|
| <b>Strategies</b>                                                      |  |

| <b>Student Workload (SWL)</b><br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا       |     |                                                                           |  |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |     | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |     | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |  |

| <b>Module Evaluation</b><br>تقييم المادة الدراسية |                |                    |                       |                 |                                  |
|---------------------------------------------------|----------------|--------------------|-----------------------|-----------------|----------------------------------|
|                                                   |                | <b>Time/Number</b> | <b>Weight (Marks)</b> | <b>Week Due</b> | <b>Relevant Learning Outcome</b> |
| <b>Formative</b>                                  | <b>Quizzes</b> | 2                  | 10% (10)              | 5 and 10        | LO #1, #2 and #10,               |

|                      |                 |     |                  |            |                      |
|----------------------|-----------------|-----|------------------|------------|----------------------|
| assessment           |                 |     |                  |            | #11                  |
|                      | Assignments     | 2   | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7 |
|                      | Projects / Lab. | 1   | 10% (10)         | Continuous | All                  |
|                      | Report          | 1   | 10% (10)         | 13         | LO #5, #8 and #10    |
| Summative assessment | Midterm Exam    | 2hr | 10% (10)         | 7          | LO #1 - #7           |
|                      | Final Exam      | 3hr | 50% (50)         | 16         | All                  |
| Total assessment     |                 |     | 100% (100 Marks) |            |                      |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|         | Material Covered                                                                      |
|---------|---------------------------------------------------------------------------------------|
| Week 1  | الظواهر اللغوية: الترادف ، المشترك اللفظي، التضاد.                                    |
| Week 2  | قواعد كتابة الألف اللينة في آخر الكلمة.                                               |
| Week 3  | الإستثناء.                                                                            |
| Week 4  | الحال.                                                                                |
| Week 5  | التمييز.                                                                              |
| Week 6  | المفاعيل الخمسة: المفعول به، المفعول فيه، المفعول المطلق، المفعول لأجله، المفعول معه. |
| Week 7  | حروف الجر ومعانيها.                                                                   |
| Week 8  | امتحان نصف الفصل.                                                                     |
| Week 9  | الاسم المذكر والمؤنث.                                                                 |
| Week 10 | الحروف من حيث النطق والكتابة: اللام الشمسية والقمرية، الحذف والزيادة.                 |
| Week 11 | الوقف.                                                                                |
| Week 12 | نص من سورة لقمان.                                                                     |
| Week 13 | الشاعر المتنبي.                                                                       |
| Week 14 | الشاعرة نازك الملائكة.                                                                |
| Week 15 | الظواهر اللغوية: الترادف ، المشترك اللفظي، التضاد.                                    |
| Week 16 | Preparatory week before the final Exam                                                |

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

|  | Material Covered |
|--|------------------|
|--|------------------|

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                   | Text     | Available in the Library ? |
|-------------------|----------|----------------------------|
| Required Texts    | الانترنت | No                         |
| Recommended Texts | الكتب    | No                         |
| Websites          |          |                            |

### Grading Scheme

| مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                                         |                         |                     |          |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade                   | التقدير             | Marks %  | Definition                            |
| <b>Success Group<br/>(50 - 100)</b>                                                                                                                                                                                                                                                                                                                                                  | <b>A</b> – Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>C</b> – Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>D</b> – Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>E</b> – Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group<br/>(0 – 49)</b>                                                                                                                                                                                                                                                                                                                                                       | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                                                                                                                                                                                                                                                                                                                                                                      |                         |                     |          |                                       |
| <b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |                         |                     |          |                                       |

| Module Information                 |                     |                               |                                                                                                                                                                                                          |        |
|------------------------------------|---------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| معلومات المادة الدراسية            |                     |                               |                                                                                                                                                                                                          |        |
| Module Title                       | English Language II |                               | Module Delivery                                                                                                                                                                                          |        |
| Module Type                        | B                   |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |        |
| Module Code                        | UOB202              |                               |                                                                                                                                                                                                          |        |
| ECTS Credits                       | 2                   |                               |                                                                                                                                                                                                          |        |
| SWL (hr/sem)                       | 50                  |                               |                                                                                                                                                                                                          |        |
| Module Level                       | UGII                | Semester of Delivery          |                                                                                                                                                                                                          |        |
| Administering Department           | Type Dept. Code     | College                       | Type College Code                                                                                                                                                                                        |        |
| Module Leader                      | رعد فالح حسن        |                               | e-mail                                                                                                                                                                                                   |        |
| Module Leader's Acad. Title        | استاذ مساعد         | Module Leader's Qualification | Ph.D.                                                                                                                                                                                                    |        |
| Module Tutor                       | Name (if available) |                               | e-mail                                                                                                                                                                                                   | E-mail |
| Peer Reviewer Name                 | Name                |                               | e-mail                                                                                                                                                                                                   | E-mail |
| Scientific Committee Approval Date | 10/3/2026           |                               | Version Number                                                                                                                                                                                           | 1.0    |
| Relation with other Modules        |                     |                               |                                                                                                                                                                                                          |        |
| العلاقة مع المواد الدراسية الأخرى  |                     |                               |                                                                                                                                                                                                          |        |
| Prerequisite module                | None                |                               | Semester                                                                                                                                                                                                 |        |
| Co-requisites module               | None                |                               | Semester                                                                                                                                                                                                 |        |

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Module Objectives</b><br/>أهداف المادة الدراسية</p> | <p>a pre-intermediate level course aiming to build and further improve language proficiency for second year students/ college of science,</p> <ol style="list-style-type: none"> <li>1. Listening Objectives: <ul style="list-style-type: none"> <li>• Understand and respond appropriately to a variety of spoken English in familiar contexts.</li> <li>• Comprehend main ideas, specific details, and implied information in spoken texts.</li> <li>• Develop listening strategies to enhance understanding.</li> </ul> </li> <li>2. Speaking Objectives: <ul style="list-style-type: none"> <li>• Engage in conversations on a range of topics using appropriate vocabulary and grammar.</li> <li>• Express opinions, preferences, and experiences.</li> <li>• Develop speaking strategies for effective communication, such as turn-taking and seeking clarification.</li> </ul> </li> <li>3. Reading Objectives: <ul style="list-style-type: none"> <li>• Read and understand a variety of texts, including articles, stories, and informational passages.</li> <li>• Comprehend main ideas, details, and implied information in written texts.</li> <li>• Develop reading strategies for comprehension and vocabulary acquisition.</li> </ul> </li> <li>4. Writing Objectives: <ul style="list-style-type: none"> <li>• Write coherent paragraphs and short texts on different topics.</li> <li>• Express ideas clearly and logically using appropriate grammar and vocabulary.</li> <li>• Develop writing strategies for organization, coherence, and accuracy.</li> </ul> </li> <li>5. Grammar and Vocabulary Objectives: <ul style="list-style-type: none"> <li>• Develop a solid understanding and usage of a wide range of grammatical structures appropriate for the pre-intermediate level.</li> <li>• Expand vocabulary knowledge to include a broader range of words, idiomatic expressions, and collocations.</li> <li>• Apply grammar and vocabulary knowledge to express oneself accurately and effectively.</li> </ul> </li> <li>6. Pronunciation and Intonation Objectives: <ul style="list-style-type: none"> <li>• Improve pronunciation accuracy of individual sounds, stress patterns, and intonation.</li> <li>• Use appropriate rhythm, stress, and intonation for effective communication.</li> <li>• Recognize and produce connected speech features to enhance fluency and naturalness.</li> </ul> </li> <li>7. Cultural Awareness Objectives: <ul style="list-style-type: none"> <li>• Develop an understanding of cultural practices, customs, and social norms in English-speaking countries.</li> <li>• Demonstrate cultural sensitivity and adapt communication accordingly.</li> <li>• Recognize the impact of culture on language use and communication styles.</li> </ul> </li> </ol> |
| <p><b>Module Learning Outcomes</b></p>                    | <p>Learner training is essential to the achievement of the Learning Outcomes.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

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|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>مخرجات التعلم<br/>للمادة الدراسية</p>                          | <ol style="list-style-type: none"> <li>1. Listening and Speaking: <ul style="list-style-type: none"> <li>• Understand and respond appropriately to a range of everyday spoken English in familiar contexts.</li> <li>• Engage in conversations and discussions on a variety of topics using appropriate language and strategies.</li> <li>• Comprehend and extract information from spoken texts, such as interviews, dialogues, and narratives.</li> </ul> </li> <li>2. Reading: <ul style="list-style-type: none"> <li>• Read and understand a variety of texts, including articles, stories, and informational passages.</li> <li>• Comprehend main ideas, details, and specific information from the texts.</li> <li>• Apply reading strategies to infer meaning from context and make predictions.</li> </ul> </li> <li>3. Writing: <ul style="list-style-type: none"> <li>• Write coherent and well-organized paragraphs and short texts on various topics.</li> <li>• Express ideas and opinions clearly and concisely.</li> <li>• Demonstrate control of grammar, vocabulary, and sentence structures appropriate for the pre-intermediate level.</li> </ul> </li> <li>4. Grammar and Vocabulary: <ul style="list-style-type: none"> <li>• Understand and use a wide range of grammatical structures and tenses, including present perfect, past simple, future forms, and conditionals.</li> <li>• Expand vocabulary knowledge to include a broader range of words, idiomatic expressions, and collocations.</li> <li>• Apply grammar and vocabulary in context to enhance communication skills.</li> </ul> </li> <li>5. Pronunciation and Intonation: <ul style="list-style-type: none"> <li>• Develop accurate pronunciation of individual sounds and common word stress patterns.</li> <li>• Use appropriate intonation and stress patterns to convey meaning effectively.</li> <li>• Understand and produce connected speech features, such as linking sounds and contractions.</li> </ul> </li> <li>6. Cultural Awareness: <ul style="list-style-type: none"> <li>• Gain insights into cultural practices, traditions, and customs in English-speaking countries.</li> <li>• Develop intercultural competence and sensitivity in communication.</li> <li>• Understand cultural influences on language use and behavior.</li> </ul> </li> </ol> |
| <p><b>Indicative<br/>Contents</b><br/>المحتويات<br/>الإرشادية</p> | <p>Indicative content includes the following.</p> <ol style="list-style-type: none"> <li>1: Greetings and Introductions <ul style="list-style-type: none"> <li>• Vocabulary: Greetings, introductions, personal information</li> <li>• Grammar: Present simple, present continuous, subject pronouns, possessive adjectives</li> <li>• Skills: Listening to and giving personal information, role-playing introductions, writing short personal profiles</li> </ul> </li> <li>2: Daily Routines <ul style="list-style-type: none"> <li>• Vocabulary: Daily activities, time expressions</li> <li>• Grammar: Present simple, adverbs of frequency, prepositions of time</li> <li>• Skills: Talking about daily routines, describing habits and schedules, writing a daily routine diary</li> </ul> </li> <li>3: Family and Relationships <ul style="list-style-type: none"> <li>• Vocabulary: Family members, relationships, adjectives to describe people</li> <li>• Grammar: Possessive 's, can/can't, imperatives</li> <li>• Skills: Talking about family members, describing people's appearance and personality, writing about a family member</li> </ul> </li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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|  | <p>4: Free Time and Hobbies</p> <ul style="list-style-type: none"> <li>• Vocabulary: Leisure activities, hobbies, sports</li> <li>• Grammar: Present simple vs. present continuous, question words</li> <li>• Skills: Discussing leisure activities, talking about hobbies and interests, writing about favorite pastimes</li> </ul> <p>5: Shopping and Money</p> <ul style="list-style-type: none"> <li>• Vocabulary: Shops, money, prices, clothes</li> <li>• Grammar: Countable and uncountable nouns, plurals, quantifiers</li> <li>• Skills: Role-playing shopping conversations, describing clothes, writing a shopping list</li> </ul> <p>6: Travel and Transportation</p> <ul style="list-style-type: none"> <li>• Vocabulary: Means of transport, travel destinations, directions</li> <li>• Grammar: Present perfect, past simple, adverbs of time</li> <li>• Skills: Discussing travel experiences, giving and following directions, writing about a memorable trip</li> </ul> <p>7: Food and Eating Habits</p> <ul style="list-style-type: none"> <li>• Vocabulary: Food items, meals, cooking, restaurants</li> <li>• Grammar: Countable and uncountable nouns, articles, some/any</li> <li>• Skills: Talking about food preferences, ordering in a restaurant, writing a recipe</li> </ul> <p>8: Health and Well-being</p> <ul style="list-style-type: none"> <li>• Vocabulary: Health issues, symptoms, remedies</li> <li>• Grammar: Should/shouldn't, modals for advice and obligation</li> <li>• Skills: Discussing health problems, giving advice, writing a health blog post</li> </ul> <p>9: Jobs and Careers</p> <ul style="list-style-type: none"> <li>• Vocabulary: Professions, job descriptions, skills</li> <li>• Grammar: Past continuous, comparatives and superlatives</li> <li>• Skills: Talking about jobs and career aspirations, describing job experiences, writing a resume</li> </ul> <p>10: Future Plans and Ambitions</p> <ul style="list-style-type: none"> <li>• Vocabulary: Future forms (will, going to, present continuous), ambitions, goals</li> <li>• Grammar: Future forms, time clauses</li> <li>• Skills: Discussing future plans, setting goals, writing a letter to your future self</li> </ul> <p>11: Technology and Communication</p> <ul style="list-style-type: none"> <li>• Vocabulary: Communication devices, social media, technology-related terms</li> <li>• Grammar: Present perfect continuous, future continuous, indirect questions</li> <li>• Skills: Discussing technology and its impact, describing communication habits, writing an email or text message</li> </ul> <p>12: Environment and Sustainability</p> <ul style="list-style-type: none"> <li>• Vocabulary: Environmental issues, natural disasters, conservation</li> <li>• Grammar: Conditional sentences, passive voice</li> <li>• Skills: Discussing environmental concerns, expressing opinions on sustainability, writing an article on environmental conservation</li> </ul> <p>13: Culture and Traditions</p> <ul style="list-style-type: none"> <li>• Vocabulary: Festivals, customs, cultural practices</li> <li>• Grammar: Reported speech, relative clauses</li> <li>• Skills: Talking about cultural events, comparing traditions, writing a description of a cultural celebration</li> </ul> <p>14: Education and Learning</p> <ul style="list-style-type: none"> <li>• Vocabulary: School subjects, learning methods, educational institutions</li> <li>• Grammar: Past perfect, modals for possibility and certainty</li> <li>• Skills: Discussing educational experiences, describing favorite subjects, writing an opinion essay on the benefits of education</li> </ul> <p>15: Travel and Tourism</p> <ul style="list-style-type: none"> <li>• Vocabulary: Tourist attractions, accommodation, travel experiences</li> <li>• Grammar: Comparative and superlative adjectives, phrasal verbs</li> </ul> |
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- Skills: Talking about travel preferences, recommending destinations, writing a travel blog post or itinerary

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| Strategies | <p>1.Communicative Approach: Emphasize communicative activities that promote interaction among students. Encourage pair and group work, role-plays, and discussions to practice language skills in meaningful contexts.</p> <p>2.Integrated Skills: Integrate the four language skills (speaking, listening, reading, and writing) in lessons to create a balanced approach to language learning. Provide opportunities for students to use and develop these skills simultaneously.</p> <p>3.Vocabulary Expansion: Incorporate vocabulary-building exercises and activities throughout the course. Use real-life contexts, visuals, and practical examples to help students learn and remember new words.</p> <p>4.Grammar Focus: Teach and reinforce grammar structures in a systematic and progressive manner. Provide clear explanations, examples, and practice exercises to ensure students understand and can apply the grammar rules correctly.</p> <p>5.Authentic Materials: Include authentic texts, such as articles, newspaper clippings, songs, and videos, to expose students to real-world language usage. This helps develop their reading and listening comprehension skills and exposes them to cultural aspects of English-speaking countries.</p> <p>6.Cultural Awareness: Integrate cultural topics and discussions into the lessons to foster cultural awareness and sensitivity. Encourage students to share their own cultural backgrounds and experiences to promote understanding and appreciation of diverse perspectives.</p> <p>7.Error Correction: Provide constructive feedback and error correction during speaking and writing activities. Help students identify and correct their mistakes, focusing on accuracy while encouraging fluency and self-expression.</p> <p>8.Technology Integration: Utilize technology tools, such as interactive whiteboards, online resources, and language learning apps, to engage students and enhance their language learning experience. Incorporate multimedia materials for listening and speaking practice.</p> <p>9.Regular Assessment: Assess students' progress regularly through quizzes, tests, and assignments. Provide timely feedback to guide their learning and address areas that need improvement.</p> <p>10.Individualization: Cater to the individual needs and learning styles of students. Offer differentiated tasks and activities to ensure all learners are appropriately challenged and supported.</p> <p>11.Cooperative Learning: Promote collaboration and teamwork among students through pair work, group projects, and peer feedback. This encourages active participation and a supportive learning environment.</p> <p>12.Review and Revision: Schedule regular review sessions to consolidate previously learned material. Encourage students to revise and practice independently, providing resources for self-study and additional practice.</p> |
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## Student Workload (SWL)

### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |   |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 109 | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 7 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 91  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 6 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |   |

## Module Evaluation

تقييم المادة الدراسية

|                      |              | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|----------------------|--------------|-------------|------------------|------------|---------------------------|
| Formative assessment | Quizzes      | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                      | Assignments  | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                      | Projects     | 1           | 10% (10)         | Continuous | All                       |
|                      | Report       | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| Summative assessment | Midterm Exam | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                      | Final Exam   | 3hr         | 50% (50)         | 16         | All                       |
| Total assessment     |              |             | 100% (100 Marks) |            |                           |

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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|        | New Headway Plus provides an integrated skills course with each unit divided into grammar, vocabulary, skills work and everyday English segments as follows:                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Week 1 | <p>Getting to know you<br/>p6</p> <p><b>Tenses</b><br/>Present, past, future p6</p> <p><b>Questions</b><br/>Where were you born?<br/>What do you do? p6</p> <p><b>Question words</b><br/>Who ...?, Why ...?,<br/>How much ...? p7</p> <p><b>Right word, wrong word</b><br/>Verbs of similar meaning<br/>speak/talk, say/tell<br/>Adjectives and nouns that go together<br/>Prepositions<br/>to, from, at, about, of, on, in, etc.<br/>Words with two meanings<br/>I met my husband on a blind date.<br/>Dates are good for you. p12</p> <p><b>Social expressions</b><br/>Have a good weekend!<br/>Same to you.<br/>p13</p> |
| Week 2 | <p>Whatever makes you happy<br/>p14</p> <p><b>Present tenses</b><br/><b>Present Simple</b><br/>She lives alone in Bristol. p14</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <p><a href="#">Present Continuous</a><br/> She's planning ... p14<br/> <a href="#">have/have got</a><br/> He has his own company.<br/> I've got an idea for ... p15<br/> <a href="#">Things I like doing</a><br/> play games<br/> have a lie-in<br/> get up late p17<br/> <a href="#">Making conversation</a><br/> What a lovely day it is today!<br/> Are you having a good time in London?<br/> Have a good weekend!<br/> p21</p>                                                                                                                                            |
| <b>Week 3</b> | <p>What's in the news?<br/> p22<br/> <a href="#">Past tenses</a><br/> <a href="#">Past Simple</a><br/> How far did he walk?<br/> I had a shower last night. p23<br/> <a href="#">Past Continuous</a><br/> I was having a shower when ... p23<br/> <a href="#">Adverbs</a><br/> drive carefully<br/> speak furiously<br/> work hard p28<br/> <a href="#">Saying when</a><br/> What's the date today?<br/> It's June the twentysecond.<br/> When did you last go to the cinema?<br/> Two weeks ago. p29</p>                                                                      |
| <b>Week 4</b> | <p>Eat, drink, and be merry!<br/> p30<br/> <a href="#">Quantity</a><br/> <a href="#">much and many</a><br/> How much milk?<br/> How many eggs? p31<br/> <a href="#">some and any</a><br/> some apples, any bananas p31<br/> <a href="#">a few, a little, a lot/lots of</a> p31<br/> <a href="#">something / someone / somewhere</a> p32<br/> <a href="#">Articles</a><br/> a shopkeeper, an old village, the north of England, He came by bus. p32<br/> <a href="#">Food</a><br/> apples, beer, bread, cake p36<br/> <a href="#">Shopping</a><br/> newsagent's, chemist's,</p> |

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|               | <p>off-licence p36</p> <p>Can you come for dinner?</p> <p>Would you like some more rice?</p> <p>Could you pass the salt, please?</p> <p>How would you like your coffee?</p> <p>This is delicious! p37</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Week 5</b> | <p>Looking forward p38</p> <p>Verb patterns</p> <p>want/hope to do</p> <p>like/enjoy doing</p> <p>looking forward to doing</p> <p>'d like to p38</p> <p>Future forms</p> <p>going to, will and Present Continuous</p> <p>I'm going to stay with a friend.</p> <p>I'll call or text you.</p> <p>I'm working late this evening. p40</p> <p>Phrasal verbs – literal</p> <p>move back</p> <p>take away</p> <p>grow up p44</p> <p>Phrasal verbs – idiomatic</p> <p>give up</p> <p>take off</p> <p>look after p44</p> <p>Expressing doubt and certainty</p> <p>Of course he will.</p> <p>He might do.</p> <p>Mmm ... maybe.</p> <p>I doubt it.</p> <p>No chance. p45</p> |
| <b>Week 6</b> | <p>The way I see it p46</p> <p>What ... like?</p> <p>What's your teacher like? p46</p> <p>Comparative and superlative adjectives</p> <p>big, bigger, biggest</p> <p>good, better, best p47</p> <p>as ... as</p> <p>It isn't as hot as Dubai. p47</p> <p>Relative pronouns</p> <p>who/that/which/where p110</p> <p>Synonyms and antonyms</p> <p>lovely, beautiful</p> <p>brilliant, terrible p52</p> <p>What's on?</p> <p>How much is it to go in the museum?</p> <p>Is it open on Sunday?</p>                                                                                                                                                                      |

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|               | What film is suitable for children? p53                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Week 7</b> | Mid-term Exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Week 8</b> | <p>Living history p54</p> <p><a href="#">Present Perfect</a></p> <p>John has lived there for three years. p55</p> <p><a href="#">for and since</a></p> <p>for two hours</p> <p>since six o'clock p55</p> <p><a href="#">ever and never</a></p> <p>Have you ever been ...?</p> <p>I've never been to South America. p56</p> <p><a href="#">Present Perfect or Past Simple</a></p> <p>Have you had an ordinary job?</p> <p>I worked in a restaurant. p57</p> <p><a href="#">Word endings</a></p> <p><a href="#">Jobs</a></p> <p>philosopher, historian, economist p57</p> <p><a href="#">Nouns and adjectives</a></p> <p>competition, famous p57</p> <p><a href="#">Word stress</a></p> <p>danger, dangerous</p> <p>invite, invitation p57</p> <p><a href="#">Agree with me!</a></p> <p>It's wonderful, isn't it?</p> <p>You come from Scotland, don't you?</p> <p>It wasn't easy, was it?</p> <p>You've lived here for years, haven't you?</p> <p>p61</p> |
| <b>Week 9</b> | <p>Girls and boys p62</p> <p><a href="#">have to</a></p> <p>She has to train hard.</p> <p>I don't have to train every day.</p> <p>Do you have to work at weekends? p63</p> <p><a href="#">should</a></p> <p>You should show him this letter. p64</p> <p><a href="#">must</a></p> <p>He must get professional help. p64</p> <p><a href="#">Things to wear</a></p> <p>belt, cap, boots, jumper, make-up p68</p> <p><a href="#">Materials</a></p> <p>leather, wool, denim, cotton p68</p> <p><a href="#">Situations</a></p> <p>job interview, party, beach holiday p68</p>                                                                                                                                                                                                                                                                                                                                                                                  |

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|                | <p><a href="#">At the doctor's</a><br/> a sore throat, flu, food poisoning<br/> I've got a fever.<br/> My body aches.<br/> My glands are swollen.<br/> p69</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Week 10</b> | <p>Time for a story<br/> p70<br/> <a href="#">Past Perfect</a><br/> They had walked twenty miles. p71<br/> <a href="#">Narrative tenses</a><br/> They saw a bear.<br/> They were looking for work. p71<br/> <a href="#">Joining sentences</a><br/> although, because<br/> when, while, before, after, as, until,<br/> as soon as p72<br/> <a href="#">Feelings</a><br/> angry, nervous, delighted, stressed p76<br/> <a href="#">Exclamations with so and such</a><br/> I was so scared!<br/> It was such a shock!<br/> We had such terrible weather!<br/> I've got so much work!<br/> p77</p>                        |
| <b>Week 11</b> | <p>Our interactive world<br/> p78<br/> <a href="#">Passives</a><br/> Mobile phones are used by almost 6 billion people.<br/> The first mobile phone call was made in 1973.<br/> Camera phones have been sold since 2002.<br/> Landline telephones will be replaced by mobile phones. p79<br/> <a href="#">Words that go together</a><br/> <a href="#">Noun + noun</a><br/> text message, businessman p81<br/> <a href="#">Verb + noun</a><br/> take notes, send a text message p81<br/> <a href="#">Adverb + adjective</a><br/> well-known, badly-behaved p81<br/> <a href="#">On the phone</a><br/> 07700 900333</p> |

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|                | <p>Can I speak to<br/>Patrick, please?<br/>I'm calling because ...<br/>Sorry, you're breaking<br/>up ...<br/>p85</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Week 12</b> | <p>Life's what you<br/>make it!<br/>p86<br/><a href="#">Present Perfect Continuous</a><br/>He's been making programmes<br/>since 2007.<br/>How long has she been working<br/>there? p87<br/><a href="#">Present Perfect Simple versus Continuous</a><br/>He's made three programmes.<br/>He's been teaching for three years. p87<br/><a href="#">Birth, marriage, death</a><br/>pregnant, born<br/>engaged, divorced<br/>funeral, died of p92<br/><a href="#">Good news, bad news</a><br/>Congratulations!<br/>That's fantastic news!<br/>What a shame!<br/>I'm so sorry.<br/>p93</p>                                                                                  |
| <b>Week 13</b> | <p>Just wondering ...<br/>p94<br/><a href="#">First conditional if + will</a><br/>If it's sunny, we'll go for a picnic.<br/>We won't go out if it rains. p95<br/><a href="#">going to and might</a><br/>What are you going to do tonight?<br/>I might go out ... p95<br/><a href="#">Second conditional if + would</a><br/>If I had a brother, I'd play with him.<br/>If I were you, I'd stop smoking. p96<br/><a href="#">Prepositions</a><br/>connected to<br/>on a date<br/>listen to<br/>think about p100<br/><a href="#">Thank you and goodbye!</a><br/>It's late. I must be<br/>going now.<br/>Thank you for a lovely<br/>evening.<br/>My pleasure!<br/>p101</p> |
| <b>Week 14</b> | <p><a href="#">Living in a stately home</a><br/>Living history<br/>Chatsworth House and<br/>the family who call it</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

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|                | <p>home p58</p> <p><a href="#">A family history</a></p> <p>David Taylor Bews<br/>from Perth, Australia<br/>researches his family<br/>history p60</p> <p><a href="#">What do you think?</a></p> <p>Stately homes<br/>Aristocracy<br/>Inherited wealth p58</p> <p><a href="#">Talking about you</a></p> <p>Have you ever ...? p57</p> <p>The lives of your grandparents p60</p> <p><a href="#">What do you think?</a></p> <p>Family history p60</p> <p><a href="#">A biography</a></p> <p>Ordering paragraphs:<br/>Two Kennedys</p> <p><a href="#">Researching facts about a famous person and writing a biography</a><br/>p111</p>                                                                                                                                                                                                                  |
| <b>Week 15</b> | <p><a href="#">Families with all boys or all girls</a></p> <p>Sons and daughters<br/>The parents of four<br/>daughters swap homes<br/>with the parents of four<br/>sons p66</p> <p><a href="#">Heptathlon champion</a></p> <p>An interview with<br/>Jessica Ennis – Britain's<br/>first world heptathlon<br/>champion p65</p> <p><a href="#">What do you think?</a></p> <p>Talking about successful people p65</p> <p>Pros and cons of all-girl or all-boy families</p> <p>The ideal family p66</p> <p><a href="#">Dress person X</a></p> <p>Describing an outfit p68</p> <p><a href="#">Letters and emails</a></p> <p>Formal and informal<br/>expressions<br/>Dear Sir or Madam,<br/>Yours sincerely,<br/>Hi Cathy,<br/>Love Steve</p> <p><a href="#">Writing a formal letter to a language school and an email to an English friend</a> p112</p> |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Learning and Teaching Resources

## مصادر التعلم والتدريس

|                          | Text                                                                                                                                                                                                                                                                                                               | Available in the Library? |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | The core textbook is <i>Soars, John and Liz, (2011), New Headway Plus Pre-Intermediate Student's Book, Special Edition, Oxford University Press</i>                                                                                                                                                                | Yes                       |
| <b>Recommended Texts</b> | New Headway Plus provides an integrated skills course with each unit divided into grammar, vocabulary, skills work and everyday English segments                                                                                                                                                                   | No                        |
| <b>Websites</b>          | Oxford University Press: The New Headway series is published by Oxford University Press. Visit their website at <a href="http://www.oup.com">www.oup.com</a> and search for "New Headway Plus, Special Edition, pre-Intermediate" or browse their English language teaching section for information on the course. |                           |

## Grading Scheme

### مخطط الدرجات

| Group                               | Grade                   | التقدير             | Marks %  | Definition                            |
|-------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group<br/>(50 - 100)</b> | <b>A</b> – Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                     | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                     | <b>C</b> – Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                     | <b>D</b> – Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                     | <b>E</b> – Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group<br/>(0 – 49)</b>      | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                     | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                     |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

(المرحلة الاولى/الفصل الاول)

## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

| Module Information                 |                                                                       |                               |                                                                                                                                                                                                                                                                        |
|------------------------------------|-----------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية            |                                                                       |                               |                                                                                                                                                                                                                                                                        |
| Module Title                       | Remote Sensing Fundamentals                                           |                               | Module Delivery                                                                                                                                                                                                                                                        |
| Module Type                        | Core                                                                  |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar                    |
| Module Code                        | RSGIS11001                                                            |                               |                                                                                                                                                                                                                                                                        |
| ECTS Credits                       | 8                                                                     |                               |                                                                                                                                                                                                                                                                        |
| SWL (hr/sem)                       | 200                                                                   |                               |                                                                                                                                                                                                                                                                        |
| Module Level                       | UGI                                                                   | Semester of Delivery          | 1                                                                                                                                                                                                                                                                      |
| Administering Department           | C                                                                     | College                       | Type College Code                                                                                                                                                                                                                                                      |
| Module Leader                      | Ban A. AL-Rizak Abbas                                                 | e-mail                        | Ban.abbas@sc.uobaghdad.edu.iq                                                                                                                                                                                                                                          |
| Module Leader's Acad. Title        | Professor                                                             | Module Leader's Qualification | Ph.D.                                                                                                                                                                                                                                                                  |
| Module Tutor                       | Abeer Nazra Abdulhameed<br>Reem Shihab Hameed<br>Tabarak Sami Hashesh | e-mail                        | <a href="mailto:Abeer.n@sc.uobaghdad.edu.iq">Abeer.n@sc.uobaghdad.edu.iq</a><br><a href="mailto:reem.hameed1204@sc.uobaghdad.edu.iq">reem.hameed1204@sc.uobaghdad.edu.iq</a><br><a href="mailto:Tabarak.Sami@sc.uobaghdad.edu.iq">Tabarak.Sami@sc.uobaghdad.edu.iq</a> |
| Peer Reviewer Name                 | م.د. احلام علي حسين                                                   | e-mail                        |                                                                                                                                                                                                                                                                        |
| Scientific Committee Approval Date | 1/10/2025                                                             | Version Number                | 1.0                                                                                                                                                                                                                                                                    |

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                     |      |          |  |
|---------------------|------|----------|--|
| Prerequisite module | None | Semester |  |
|---------------------|------|----------|--|

|                      |      |          |  |
|----------------------|------|----------|--|
| Co-requisites module | None | Semester |  |
|----------------------|------|----------|--|

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <p>By the end of this course, students will:</p> <ul style="list-style-type: none"> <li>Understand the basic concepts of remote sensing including electromagnetic spectrum, platforms, sensors and image interpretation techniques.</li> <li>Learn the principles of photogrammetry and stereoscopic viewing of aerial imagery.</li> <li>Be able to perform essential image processing tasks such as radiometric and geometric correction, filtering, and supervised and unsupervised image classification.</li> <li>Gain practical skills in using remote sensing techniques for land cover mapping, monitoring vegetation and detecting environmental changes.</li> <li>Be able to evaluate the suitability of available remote sensing data and techniques for various real-world applications.</li> <li>Develop hands-on experience in analyzing remote sensing images using software tools for information extraction and problem-solving.</li> <li>Be exposed to communication skills through assignments, projects and presentations involving remote sensing concepts.</li> <li>Gain experience in teamwork by collaborating with peers on assignments and projects utilizing remote sensing data and techniques.</li> <li>Develop an overall perspective on the role, potential and limitations of remote sensing for environmental monitoring and resource management.</li> </ul> <p>So the learning objectives listed above aim to equip students with the fundamental knowledge, skills and perspectives related to remote sensing through course lectures, assignments, projects and other activities. The achievement of these objectives should then lead to the learning outcomes - the capabilities that students demonstrate upon completing the course.</p> |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <ul style="list-style-type: none"> <li>Describe the basic concepts and terminology of remote sensing including electromagnetic spectrum, platforms, sensor systems and image interpretation techniques.</li> <li>Explain the principles of photogrammetry and the geometry of aerial imagery. Extract features and measurements from images.</li> <li>Perform essential image processing tasks such as radiometric and geometric correction, image enhancement and image classification.</li> <li>Apply remote sensing techniques to map land cover and land use, monitor vegetation and detect environmental changes.</li> <li>Critically evaluate the suitability of remote sensing data and methods for different applications. Identify limitations and sources of error.</li> <li>Interpret and analyze remotely sensed images using appropriate software to extract information and solve problems.</li> <li>Communicate technical concepts related to remote sensing in oral and written form.</li> <li>Work collaboratively in a team to complete assignments and projects involving remote sensing data and techniques.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Indicative Contents</b><br/>المحتويات الإرشادية</p> | <ol style="list-style-type: none"> <li>1. Introduction to Remote Sensing <ul style="list-style-type: none"> <li>- Definition of remote sensing</li> <li>- Electromagnetic spectrum and spectral bands used in remote sensing</li> <li>- Active and passive remote sensing systems</li> <li>- Types of remote sensing platforms (satellites, aircrafts, UAVs)</li> </ul> </li> <li>2. Sensor Systems and Image Interpretation <ul style="list-style-type: none"> <li>- Sensor characteristics (spatial, temporal and spectral resolution)</li> <li>- Data formats (raster, vector)</li> <li>- Image interpretation techniques (visual, digital)</li> </ul> </li> <li>3. Photogrammetry <ul style="list-style-type: none"> <li>- Principles of aerial photography</li> <li>- Film-based and digital imaging sensors</li> <li>- Stereoscopic viewing and imaging geometry</li> <li>- Image measurements and feature extraction</li> </ul> </li> <li>4. Image Processing <ul style="list-style-type: none"> <li>- Image preprocessing (radiometric and geometric correction)</li> <li>- Image enhancement techniques (contrast stretch, filtering)</li> <li>- Image classification (supervised and unsupervised)</li> </ul> </li> <li>5. Applications of Remote Sensing <ul style="list-style-type: none"> <li>- Land use/cover mapping</li> <li>- Vegetation monitoring</li> <li>- Urban studies</li> <li>- Natural hazard monitoring</li> </ul> </li> </ol> |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| <p><b>Learning and Teaching Strategies</b><br/>استراتيجيات التعلم والتعليم</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Strategies</b></p>                                                       | <ol style="list-style-type: none"> <li>a. Lectures - Use lectures to introduce and explain the key concepts and topics. Keep lectures interactive with questions, examples and discussions.</li> <li>b. Demonstrations - Demonstrate hands-on how to perform image processing and analysis tasks using software tools. This helps students visualize and apply the concepts.</li> <li>c. Assignments - Give students assignments to apply what they learn to real data and scenarios. This could include image processing, classification and interpretation tasks.</li> </ol> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>d. Projects - Assign a semester-long project for students to work independently or in groups. This allows for deeper learning and application of all course concepts.</p> <p>e. Labs - Incorporate dedicated lab sessions where students work on assignments and projects using software tools under supervision. Clarify doubts and provide feedback.</p> <p>f. Discussions - Hold group and class discussions to elicit student questions, clarify concepts and reason through complex problems.</p> <p>g. Guest lectures - Invite experts and practitioners from industry to give real-world perspective on remote sensing applications.</p> <p>h. Case studies - Use case studies of actual remote sensing projects to illustrate applications and limitations of techniques.</p> <p>i. Field trips - Organize field trips where possible for students to see and collect remote sensing data using ground sensors for comparison.</p> <p>j. Visual aids - Use illustrations, diagrams, videos and remote sensing images to enhance learning and understanding.</p> <p>- In summary, a mixture of lectures, demonstrations, hands-on assignments, projects, labs, discussions and real-world examples through case studies and guest lectures are effective strategies for teaching remote sensing fundamentals. The emphasis should be on both conceptual understanding and practical application of the techniques.</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| <b>Student Workload (SWL)</b><br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا       |  |                                                                           |   |
|--------------------------------------------------------------------------------|--|---------------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 4 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 4 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              |  |                                                                           |   |

| <b>Module Evaluation</b><br>تقييم المادة الدراسية |                        |                 |                |                   |                           |
|---------------------------------------------------|------------------------|-----------------|----------------|-------------------|---------------------------|
|                                                   |                        | Time/<br>Number | Weight (Marks) | Week Due          | Relevant Learning Outcome |
| <b>Formative assessment</b>                       | <b>Quizzes</b>         | 2               | 10% (10)       | 5 and 10          | LO #1, #2 and #10, #11    |
|                                                   | <b>Assignments</b>     | 6               | 10% (10)       | 2,3,6,8,10 and 12 | LO #3, #4 and #6, #7      |
|                                                   | <b>Projects / Lab.</b> | 1               | 10% (10)       | Continuous        | All                       |
|                                                   | <b>Report</b>          | 1               | 10% (10)       | 13                | LO #5, #8 and #10         |

|                             |                     |     |                  |    |            |
|-----------------------------|---------------------|-----|------------------|----|------------|
| <b>Summative assessment</b> | <b>Midterm Exam</b> | 2hr | 10% (10)         | 7  | LO #1 - #7 |
|                             | <b>Final Exam</b>   | 3hr | 50% (50)         | 16 | All        |
| <b>Total assessment</b>     |                     |     | 100% (100 Marks) |    |            |

### Delivery Plan (Weekly Syllabus)

#### المنهاج الاسبوعي النظري

|                | <b>Material Covered</b>                                                                                                                                                                                                                                                       |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | 1. Basic concept of remote sensing, 2. Principles of remote sensing, 3. Remote sensing Platforms, 4. Passive/Active remote sensing, 5. Airborne and Space borne remote sensing, 6. Ideal remote sensing, 7. Advantages of remote sensing, 8. Disadvantages of remote sensing. |
| <b>Week 2</b>  | 1. Electromagnetic energy, 2. Energy source and radiation principles, 3. Solar radiation, 4. Radiation from the earth, 5. EMR Spectrum, 6. Remote sensing using EMR                                                                                                           |
| <b>Week 3</b>  | 1. Energy interactions in the atmosphere, 2. Composition of the atmosphere<br>3. Energy interaction, 4. Scattering, 5. Types of scattering, 6. Absorption.                                                                                                                    |
| <b>Week 4</b>  | 1. Energy interactions with earth surface features, 2. Reflection, 3. Diffuse and Specular Reflection, 4. Spectral Reflectance Curves, 5. Transmission.                                                                                                                       |
| <b>Week 5</b>  | 1. Spectral Reflectance Curves, 2. Spectral reflectance curve for vegetation, 3. Spectral reflectance curve for soil, 4. Spectral reflectance curve for water, 5. Spectral Reflectance Curve for Building.                                                                    |
| <b>Week 6</b>  | 1. Satellites and orbits, 2. Characteristics of satellite orbits, 3. Geosynchronous orbit, 4. Polar orbit, 5. Sun- synchronous orbit.                                                                                                                                         |
| <b>Week 7</b>  | Review + Mid-term Exam                                                                                                                                                                                                                                                        |
| <b>Week 8</b>  | 1. Resolutions, 2. Spatial Resolution, 3. Spectral Resolution, 4. Radiometric Resolution, 5. Temporal Resolution.                                                                                                                                                             |
| <b>Week 9</b>  | 1. MULTISPECTRAL REMOTE SENSING, 2. MULTISPECTRAL Scanners<br>3. Across- track scanning, 4. Example, 5. Along- track scanning, 6. Thematic Mapper.                                                                                                                            |
| <b>Week 10</b> | 1. THERMAL REMOTE SENSING, 2. Thermal scanner, 3. Principle involved in the Thermal sensing, 4. Thermal imaging.                                                                                                                                                              |
| <b>Week 11</b> | 1. HYPERSPECTRAL REMOTE SENSING, 2. Hyperspectral sensors, 3. Examples.                                                                                                                                                                                                       |
| <b>Week 12</b> | 1. FEATURES OF THE REMOTE SENSING SATELLITES, 2 Landsat satellite program<br>3. Spot satellite program, 4. IRS satellite program                                                                                                                                              |
| <b>Week 13</b> | 1- Correction of Remote sensing data, 2. Geometric correction<br>3. Radiometric correction                                                                                                                                                                                    |
| <b>Week 14</b> | 1. Ground Truth Collection, 2. Visual Interpretation, 3. Digital and analog methods of Image Interpretation                                                                                                                                                                   |

|                |                                                                                                                                                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <b>Correction of Remote sensing data</b><br><b>1- Geometric correction</b><br><b>2- Radiometric correction</b><br>عرض المحاضرة من عرض و شرح المحاضرة حضوريا في القاعة الدراسية لامتحانات التحريرية والشفهية والواجبات البيتية |
| <b>Week 15</b> | 1.Land Surface Temperature (LST), 2. Algorithm of Surface Temperature Calculation from Thermal Bands, 3. Normalized Difference Vegetation Index (NDVI), 4. Land surface emissivity (E)                                        |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                                                                                                                                                 |

| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي للمختبر |                                                                             |
|-------------------------------------------------------------------------|-----------------------------------------------------------------------------|
|                                                                         | <b>Material Covered</b>                                                     |
| <b>Week 1</b>                                                           | <b>How to download satellite images</b>                                     |
| <b>Week 2</b>                                                           | <b>Introduction of ERDAS IMAGINE 2014 and tools</b>                         |
| <b>Week 3</b>                                                           | <b>How to open satellite images using ERDAS IMAGINE 2014</b>                |
| <b>Week 4</b>                                                           | <b>Learn how to import and export images to ERDAS IMAGINE 2014</b>          |
| <b>Week 5</b>                                                           | <b>Measurement using measuring tools for length, area, and dimension</b>    |
| <b>Week 6</b>                                                           | <b>Pre-processing Raster Data</b><br>-Image correction<br>- Composite bands |
| <b>Week 7</b>                                                           | <b>Review + Mid-term Exam</b>                                               |
| <b>Week 8</b>                                                           | <b>Pre-processing Raster Data</b><br>-Image correction<br>- Composite bands |
| <b>Week 9</b>                                                           | <b>Spatial Data</b><br>- Raster Data<br>- Metadata                          |
| <b>Week 10</b>                                                          | <b>Pre-processing Raster Data</b><br>-Clipping<br>- Mosaic                  |

|         |                                                                   |
|---------|-------------------------------------------------------------------|
| Week 11 | Image Processing<br>Classification<br>Unsupervised Classification |
| Week 12 | Image Processing<br>Classification<br>Supervised Classification   |
| Week 13 | Environmental management applications<br>- Spectral indices       |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                   | Text                                                                                                | Available in the Library? |
|-------------------|-----------------------------------------------------------------------------------------------------|---------------------------|
| Required Texts    | Campbell J.B. (2002) Introduction to Remote Sensing, 3rd ed., The Guilford Press.                   | Yes                       |
| Recommended Texts | Curran P.J., Principles of Remote Sensing, UK, ELBS.                                                | yes                       |
| Websites          | <a href="https://www.coursera.org/browse/Remote">https://www.coursera.org/browse/Remote</a> Sensing |                           |

### Grading Scheme

مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(50 - 100) | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                             | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                             | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                             | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                             | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)      | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                             | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                             |                  |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

### Module Information

معلومات المادة الدراسية

|                                    |                              |                     |                               |                                                                                                                                                                                                          |   |
|------------------------------------|------------------------------|---------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Module Title                       | Digital Image Processing I   |                     |                               | Module Delivery                                                                                                                                                                                          |   |
| Module Type                        | Core                         |                     |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |   |
| Module Code                        | RSGIS11002                   |                     |                               |                                                                                                                                                                                                          |   |
| ECTS Credits                       | 2                            |                     |                               |                                                                                                                                                                                                          |   |
| SWL (hr/sem)                       | ٢                            |                     |                               |                                                                                                                                                                                                          |   |
| Module Level                       |                              | UGI                 | Semester of Delivery          |                                                                                                                                                                                                          | 1 |
| Administering Department           |                              | B                   | College                       | Type College Code                                                                                                                                                                                        |   |
| Module Leader                      | Mohammed ismaeal abdalmajeed |                     | e-mail                        | mohammed.ismael@sc.uobaghdad.edu.iq                                                                                                                                                                      |   |
| Module Leader's Acad. Title        |                              | Assistant Professor | Module Leader's Qualification |                                                                                                                                                                                                          |   |
| Module Tutor                       | Name (if available)          |                     | e-mail                        | E-mail                                                                                                                                                                                                   |   |
| Peer Reviewer Name                 |                              | ا.د فالح حسن محمود  | e-mail                        |                                                                                                                                                                                                          |   |
| Scientific Committee Approval Date |                              | 1/10/2025           | Version Number                |                                                                                                                                                                                                          |   |

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                      |      |          |  |
|----------------------|------|----------|--|
| Prerequisite module  | None | Semester |  |
| Co-requisites module | None | Semester |  |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>                | <p>Here are some learning objectives for a course on digital image processing:</p> <ol style="list-style-type: none"> <li>1.To understand the sensing, acquisition and storage of digital images.</li> <li>2.To study the image fundamentals and mathematical transforms necessary for image processing.</li> <li>3.To understand the digital processing systems and corresponding terminology.</li> <li>4.To understand the base image transformation domains and methods.</li> <li>5.To have an understanding of colour models, type of image representations and related statistics.</li> <li>6.To study the image enhancement techniques.</li> <li>7.To study image restoration.</li> </ol> <p>Finally, this course is designed to give undergraduate students all the fundamentals in 2-D digital image processing with emphasis in image processing techniques, image filtering design and applications.</p>                                                                                                                                                                                                                                                                                                                         |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p> | <p>After completing a course on digital image processing , students should be able to:</p> <ol style="list-style-type: none"> <li>1.Have a clear understanding of the principals the Digital Image Processing terminology used to describe features of images.</li> <li>2.Have a good understanding of the mathematical foundations for digital manipulation of images; image acquisition; preprocessing; Fourier domain processing.</li> <li>3.Be able to write programs using Matlab language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression.</li> <li>4.Have knowledge of the Digital Image Processing Systems.</li> <li>5.Be able to understand the documentation for, and make use of, the MATLAB library and MATLAB Digital Image Processing Toolbox (IPT).</li> <li>6.Learn and understand the Image Enhancement in the Spatial Domain.</li> <li>7.Learn and understand the Image Enhancement in the Frequency Domain. 8. Understand the Image Restoration, Representation and Description.</li> </ol> <p>Finally, The students would get a firm foundation in 2-D image processing and be able to handle real-world image processing problems.</p> |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>                | <p>Here are some indicative contents that may be covered in a course on digital image processing :</p> <ol style="list-style-type: none"> <li>1.Image sources and generation</li> <li>2.Image sampling and quantization</li> <li>3.Same basic relationship between pixels</li> <li>4.Intensity transformations and spatial filtering background.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                           | <p>5. Some Basic Intensity Transformation Functions</p> <p>6. Histogram Processing</p> <p>7. Fundamentals of Spatial Filtering</p> <p>8. Smoothing Spatial Filters</p> <p>9. Sharpening Spatial Filters</p> <p>10. Combining Spatial Enhancement Methods</p> <p>11. The Discrete Fourier Transform (DFT) of one Variable</p> <p>12. Extension to Functions of Two Variables</p> <p>13. Some Properties of the 2-D Discrete Fourier Transform</p> <p>14. The Basics of Filtering in the Frequency Domain</p> <p>15. Image Smoothing Using Frequency Domain Filters</p> <p>16. Image Sharpening Using Frequency Domain Filters</p> <p>17. Basic Image Restoration techniques</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p style="text-align: center;"><b>Learning and Teaching Strategies</b></p> <p style="text-align: center;">استراتيجيات التعلم والتعليم</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                                                           | <p>1. Communicative Approach: Emphasize communicative activities that promote interaction among students. Encourage pair and group work, role-plays, and discussions to practice language skills in meaningful contexts.</p> <p>2. Integrated Skills: Integrate the four language skills (speaking, listening, reading, and writing) in lessons to create a balanced approach to language learning. Provide opportunities for students to use and develop these skills simultaneously.</p> <p>3. Vocabulary Expansion: Incorporate vocabulary-building exercises and activities throughout the course. Use real-life contexts, visuals, and practical examples to help students learn and remember new words.</p> <p>4. Grammar Focus: Teach and reinforce grammar structures in a systematic and progressive manner. Provide clear explanations, examples, and practice exercises to ensure students understand and can apply the grammar rules correctly.</p> <p>5. Authentic Materials: Include authentic texts, such as articles, newspaper clippings, songs, and videos, to expose students to real-world language usage. This helps develop their reading and listening comprehension skills and exposes them to cultural aspects of English-speaking countries.</p> <p>6. Cultural Awareness: Integrate cultural topics and discussions into the lessons to foster cultural awareness and sensitivity. Encourage students to share their own cultural backgrounds and experiences to promote understanding and appreciation of diverse perspectives.</p> <p>7. Error Correction: Provide constructive feedback and error correction during speaking and writing activities. Help students identify and correct their mistakes, focusing on</p> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>accuracy while encouraging fluency and self-expression.</p> <p>8. Technology Integration: Utilize technology tools, such as interactive whiteboards, online resources, and language learning apps, to engage students and enhance their language learning experience. Incorporate multimedia materials for listening and speaking practice.</p> <p>9. Regular Assessment: Assess students' progress regularly through quizzes, tests, and assignments. Provide timely feedback to guide their learning and address areas that need improvement.</p> <p>10. Individualization: Cater to the individual needs and learning styles of students. Offer differentiated tasks and activities to ensure all learners are appropriately challenged and supported.</p> <p>11. Cooperative Learning: Promote collaboration and teamwork among students through pair work, group projects, and peer feedback. This encourages active participation and a supportive learning environment.</p> <p>12. Review and Revision: Schedule regular review sessions to consolidate previously learned material. Encourage students to revise and practice independently, providing resources for self-study and additional practice.</p> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |   |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 109 | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 7 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 91  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 6 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |   |

### Module Evaluation

تقييم المادة الدراسية

|                             |                     | Time/Number | Weight (Marks) | Week Due   | Relevant Learning Outcome |
|-----------------------------|---------------------|-------------|----------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>      | 2           | 10% (10)       | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>  | 2           | 10% (10)       | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects</b>     | 1           | 10% (10)       | Continuous | All                       |
|                             | <b>Report</b>       | 1           | 10% (10)       | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b> | 2hr         | 10% (10)       | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>   | 3hr         | 50% (50)       | 16         | All                       |

|                                                            |                                                                                                                                                                                                                                                                                                                   |                     |          |                                       |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|---------------------------------------|
| Total assessment                                           |                                                                                                                                                                                                                                                                                                                   | 100% (100 Marks)    |          |                                       |
| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي النظري |                                                                                                                                                                                                                                                                                                                   |                     |          |                                       |
|                                                            | Material Covered                                                                                                                                                                                                                                                                                                  |                     |          |                                       |
| Week 1                                                     |                                                                                                                                                                                                                                                                                                                   |                     |          |                                       |
| Learning and Teaching Resources<br>مصادر التعلم والتدريس   |                                                                                                                                                                                                                                                                                                                   |                     |          |                                       |
|                                                            | Text                                                                                                                                                                                                                                                                                                              |                     |          | Available in the Library?             |
| Required Texts                                             | Soars, John and Liz, (2011), New Headway Plus, Special Edition, Beginner Level, Oxford University Press.                                                                                                                                                                                                          |                     |          | Yes                                   |
| Recommended Texts                                          | New Headway Plus provides an integrated skills course with each unit divided into grammar, vocabulary, skills work and everyday English segments                                                                                                                                                                  |                     |          | yes                                   |
| Websites                                                   | Oxford University Press: The New Headway series is published by Oxford University Press. Visit their website at <a href="http://www.oup.com">www.oup.com</a> and search for "New Headway Plus, Special Edition, Beginner Level " or browse their English language teaching section for information on the course. |                     |          |                                       |
| Grading Scheme<br>مخطط الدرجات                             |                                                                                                                                                                                                                                                                                                                   |                     |          |                                       |
| Group                                                      | Grade                                                                                                                                                                                                                                                                                                             | التقدير             | Marks %  | Definition                            |
| Success Group<br>(50 - 100)                                | A - Excellent                                                                                                                                                                                                                                                                                                     | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                            | B - Very Good                                                                                                                                                                                                                                                                                                     | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                            | C - Good                                                                                                                                                                                                                                                                                                          | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                            | D - Satisfactory                                                                                                                                                                                                                                                                                                  | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                            | E - Sufficient                                                                                                                                                                                                                                                                                                    | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 – 49)                                     | FX – Fail                                                                                                                                                                                                                                                                                                         | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                            | F – Fail                                                                                                                                                                                                                                                                                                          | راسب                | (0-44)   | Considerable amount of work required  |
|                                                            |                                                                                                                                                                                                                                                                                                                   |                     |          |                                       |

### Module Information

معلومات المادة الدراسية

|              |            |                                                                                                                                                                                                                                                     |
|--------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module Title | Physics    | Module Delivery                                                                                                                                                                                                                                     |
| Module Type  | Core       | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code  | RSGIS11003 |                                                                                                                                                                                                                                                     |
| ECTS Credits | 8          |                                                                                                                                                                                                                                                     |
| SWL (hr/sem) | 200        |                                                                                                                                                                                                                                                     |

|                                    |                          |                               |                                  |
|------------------------------------|--------------------------|-------------------------------|----------------------------------|
| Module Level                       | UGI                      | Semester of Delivery          | 1                                |
| Administering Department           | C                        | College                       | Type College Code                |
| Module Leader                      | Zehraa najim abdul-ameer | e-mail                        | Zehraa.najim@sc.uobaghdad.edu.iq |
| Module Leader's Acad. Title        | Professor                | Module Leader's Qualification | Ph.D.                            |
| Module Tutor                       | Name (if available)      | e-mail                        | E-mail                           |
| Peer Reviewer Name                 | Muna Hussein Ahmed       | e-mail                        |                                  |
| Scientific Committee Approval Date | 1/10/2025                | Version Number                | 1.0                              |

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                      |      |          |  |
|----------------------|------|----------|--|
| Prerequisite module  | None | Semester |  |
| Co-requisites module | None | Semester |  |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                   |                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية | 7. To develop problem solving skills and understanding of general physics through the application of techniques.<br>8. To understand motion laws, velocity and acceleration from.<br>9. This course deals with the basic concept of energy<br>10. This is the basic subject for all types of force. |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                             | <p>11. To understand three newton's laws and electromagnetic problems.</p> <p>12. To perform Maxwell's equation and its applications.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p> | <ul style="list-style-type: none"> <li>• Apply fundamental physics principles to solve quantitative and qualitative problems in mechanics, thermodynamics, electromagnetism, optics and modern physics.</li> <li>• Perform experiments using laboratory equipment to verify physical theories, measure fundamental constants and analyze experimental uncertainties and sources of error.</li> <li>• Interpret physics concepts through mathematical formulation and use equations to model real-world physical systems.</li> <li>• Recognize the role of evidence, assumptions, logic and subjectivity in developing and evaluating scientific theories.</li> <li>• Explain physics concepts and justify solutions clearly and precisely using appropriate terminology in speech and writing.</li> <li>• Evaluate the limitations and practical applications of physics in various domains of science and technology.</li> <li>• Work productively with others to carry out experimental procedures, analyze data and develop group solutions to problems.</li> <li>• Demonstrate a capacity for independent inquiry, critical thinking and self-directed learning in studying physics.</li> <li>• Develop an appreciation for the thought processes, evidence and creativity involved in the scientific enterprise.</li> </ul> <p>Compared to learning objectives which state what students will learn and be able to do during the course, learning outcomes focus on what students have achieved and can demonstrate by the end of the course.</p> <p>The outcomes listed above reflect abilities in several domains by the end of the physics course:</p> <ol style="list-style-type: none"> <li>1. Application of conceptual knowledge</li> <li>2. Experimental and practical skills</li> <li>3. Mathematical and quantitative problem-solving skills</li> <li>4. Critical thinking and perspective</li> <li>5. Communication skills</li> <li>13. Collaboration and teamwork</li> <li>14. Independent learning and inquiry</li> <li>15. Attitudes towards physics and the scientific process</li> </ol> <p>The wording, scope and level of detail of outcomes can vary depending on your course format, level, aims and priorities. But in general, learning outcomes for a physics course should encompass the development of knowledge, skills, perspectives and attitudes in students.</p> |
| <b>Indicative Contents</b>                                                  | <p>Indicative content includes the following.</p> <p><u>Introduction to physics: One-dimensional motion</u> Displacement, velocity, and time: One-dimensional</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

|                     |                                                                                                                                                                                                        |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| المحتويات الإرشادية | <u>motionAcceleration: One-dimensional motion</u>                                                                                                                                                      |
|                     | <u>Kinematic formulas and projectile motion: One-dimensional motionOld videos on projectile motion</u>                                                                                                 |
|                     | Revision problem classes [6 hrs]                                                                                                                                                                       |
|                     | <u>Newton's laws of motion: Forces and Newton's laws of motionNormal force and contact force: Forces and Newton's laws of motionBalanced and unbalanced forces: Forces and Newton's laws of motion</u> |
|                     | <u>Forces and Newton's laws of motionInclined planes and friction: Forces and Newton's laws of motionTension: Forces and Newton's laws of motionTreating systems</u>                                   |
|                     | <u>introduction to electromagnetic waves: Electromagnetic waves and interferenceInterference of electromagnetic waves</u>                                                                              |
|                     | Revision problem classes [6 hrs]                                                                                                                                                                       |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|            |                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strategies | Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Student Workload (SWL)

### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |  |                                                                           |   |
|--------------------------------------------------------------------------------|--|---------------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 4 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 4 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              |  |                                                                           |   |

## Module Evaluation

### تقييم المادة الدراسية

|                      |                 | Time/Number | Weight (Marks) | Week Due          | Relevant Learning Outcome |
|----------------------|-----------------|-------------|----------------|-------------------|---------------------------|
| Formative assessment | Quizzes         | 2           | 10% (10)       | 5 and 10          | LO #1, #2 and #10, #11    |
|                      | Assignments     | 6           | 10% (10)       | 2,3,6,8,10 and 12 | LO #3, #4 and #6, #7      |
|                      | Projects / Lab. | 1           | 10% (10)       | Continuous        | All                       |

|                             |                     |     |                  |    |                   |
|-----------------------------|---------------------|-----|------------------|----|-------------------|
|                             | <b>Report</b>       | 1   | 10% (10)         | 13 | LO #5, #8 and #10 |
| <b>Summative assessment</b> | <b>Midterm Exam</b> | 2hr | 10% (10)         | 7  | LO #1 - #7        |
|                             | <b>Final Exam</b>   | 3hr | 50% (50)         | 16 | All               |
| <b>Total assessment</b>     |                     |     | 100% (100 Marks) |    |                   |

### Delivery Plan (Weekly Syllabus)

#### المنهاج الاسبوعي النظري

|                | <b>Material Covered</b>                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Introduction - Introduction to physics, motion laws,-Motion in 2D<br>Projectile 1D                                           |
| <b>Week 2</b>  | Force and motion, Types of forces                                                                                            |
| <b>Week 3</b>  | Review of Applications of forces Gravitational forces, Centripetal force                                                     |
| <b>Week 4</b>  | Review of Work , Energy ,Types of energy, Laws of conservation of energy ,and applications<br>POWER and relation with energy |
| <b>Week 5</b>  | Review Momentum ,Linear momentum, Conservation of momentum                                                                   |
| <b>Week 6</b>  | Review of Collision -elastic –inelastic 2D collision                                                                         |
| <b>Week 7</b>  | Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit                                                          |
| <b>Week 8</b>  | Review of Center of mass                                                                                                     |
| <b>Week 9</b>  | Waves ,Waves types ,Waves parameters, Hooks law                                                                              |
| <b>Week 10</b> | Quantities ,Vectors ,Scalars, Vector addition ,Subtraction ,Vector product ,Scalar product                                   |
| <b>Week 11</b> | Triple product ,Divergence ,Curl ,Laplace                                                                                    |
| <b>Week 12</b> | principles of electromagnetic theory<br>Maxwell's equations, differential form<br>Integral form                              |
| <b>Week 13</b> | Electromagnetic spectrum, radio stations ,antenna                                                                            |
| <b>Week 14</b> | Energy current density, Poynting vector ,Electric field energy density,Magnetic field energy density                         |
| <b>Week 15</b> | Electromagnetic spectrum, Regions ,Wavelengths ,Applications                                                                 |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                                                |

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

|               | <b>Material Covered</b>          |
|---------------|----------------------------------|
| <b>Week 1</b> | Lab 1: Introduction to mechanics |

|               |                            |
|---------------|----------------------------|
| <b>Week 2</b> | Lab 2: simple pendulum     |
| <b>Week 3</b> | Lab 3: diffraction grating |
| <b>Week 4</b> | Lab 4: Flywheel            |
| <b>Week 5</b> | Lab 5: surface tension     |
| <b>Week 6</b> | Lab 6: refractive index    |
| <b>Week 7</b> | Lab 7: sound velocity      |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                          | Text                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Available in the Library? |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | <p>1. Introductory Physics:</p> <ul style="list-style-type: none"> <li>- "University Physics" by Young and Freedman</li> <li>- "Physics for Scientists and Engineers" by Giancoli</li> <li>- "Fundamentals of Physics" by Halliday, Resnick, and Walker</li> </ul> <p>2. Classical Mechanics:</p> <ul style="list-style-type: none"> <li>- "Classical Mechanics" by Herbert Goldstein</li> <li>- "Classical Dynamics of Particles and Systems" by Thornton and Marion</li> <li>- "Introduction to Classical Mechanics" by David Morin</li> </ul> <p>3. Electromagnetism:</p> <ul style="list-style-type: none"> <li>- "Introduction to Electrodynamics" by David Griffiths</li> <li>- "Electricity and Magnetism" by Edward Purcell</li> <li>- "Classical Electrodynamics" by Jackson</li> </ul> <p>4. Quantum Mechanics:</p> <ul style="list-style-type: none"> <li>- "Principles of Quantum Mechanics" by Shankar</li> <li>- "Modern Quantum Mechanics" by Sakurai</li> <li>- "Quantum Mechanics Concepts and Applications" by Nouredine Zettili</li> </ul> <p>5. Statistical Mechanics:</p> <ul style="list-style-type: none"> <li>- "An Introduction to Thermal Physics" by Daniel Schroeder</li> <li>- "Statistical Mechanics: Entropy, Order Parameters, and Complexity" by James Sethna</li> <li>- "Statistical Mechanics" by Pathria and Beale</li> </ul> <p>Schaum outlines(book). 2003.vol2</p> | Yes                       |
| <b>Recommended Texts</b> | <p>1. Introductory Physics:</p> <ul style="list-style-type: none"> <li>- "Concepts of Physics" by H.C. Verma</li> <li>- "The Feynman Lectures on Physics" by Richard Feynman</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | yes                       |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | <ul style="list-style-type: none"> <li>- "Physics for Scientists and Engineers with Modern Physics" by Tipler and Mosca</li> </ul> <p>2. Classical Mechanics:</p> <ul style="list-style-type: none"> <li>- "Classical Mechanics" by Taylor</li> <li>- "Classical Mechanics" by Thornton and Marion</li> <li>- "Analytical Mechanics" by Fowles and Cassiday</li> </ul> <p>3. Electromagnetism:</p> <ul style="list-style-type: none"> <li>- "Introduction to Electrodynamics" by David Griffiths</li> <li>- "Electricity and Magnetism" by Edward Purcell</li> <li>- "Electromagnetic Fields" by Wangsness</li> </ul> <p>4. Quantum Mechanics:</p> <ul style="list-style-type: none"> <li>- "Principles of Quantum Mechanics" by Shankar</li> <li>- "Modern Quantum Mechanics" by Sakurai</li> <li>- "Quantum Mechanics and Path Integrals" by Feynman and Hibbs</li> </ul> <p>5. Statistical Mechanics:</p> <ul style="list-style-type: none"> <li>- "Thermal Physics" by Kittel and Kroemer</li> <li>- "Statistical Physics of Particles" by Mehran Kardar</li> <li>- "Introduction to Modern Statistical Mechanics" by David Chandler</li> </ul> <p>Electromagnetic theory (book). 2000.vol.1</p> |  |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Websites</b> | <ol style="list-style-type: none"> <li>1. Khan Academy (<a href="https://www.khanacademy.org/science/physics">https://www.khanacademy.org/science/physics</a>) - Khan Academy is a popular online learning platform that offers free video lessons and practice problems in physics topics ranging from classical mechanics to modern physics.</li> <li>2. MIT OpenCourseWare (<a href="https://ocw.mit.edu/courses/physics/">https://ocw.mit.edu/courses/physics/</a>) - MIT OpenCourseWare is a free and open educational resource that provides access to MIT's course materials from physics courses. The website includes lecture notes, problem sets, and exams.</li> <li>3. Physics Classroom (<a href="https://www.physicsclassroom.com/">https://www.physicsclassroom.com/</a>) - Physics Classroom is an online tutorial that covers topics in physics from high school to college level. The website includes interactive lessons, simulations, and practice problems.</li> <li>4. HyperPhysics (<a href="http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html">http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html</a>) - HyperPhysics is an online encyclopedia of physics concepts that covers topics from mechanics to cosmology. The website includes interactive diagrams and links to other resources.</li> <li>5. Physlet Physics (<a href="https://www.compadre.org/Physlets/">https://www.compadre.org/Physlets/</a>) - Physlet Physics is a collection of interactive simulations that can be used to illustrate physics concepts. The website includes simulations on a range of topics from mechanics to quantum mechanics.</li> <li>6. Wolfram Physics Project (<a href="https://www.wolframphysics.org/">https://www.wolframphysics.org/</a>) - The Wolfram Physics Project is a new approach to understanding the fundamental laws of physics. The website</li> </ol> |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Grading Scheme

مخطط الدرجات

| Group         | Grade         | التقدير | Marks %  | Definition              |
|---------------|---------------|---------|----------|-------------------------|
| Success Group | A - Excellent | امتياز  | 90 - 100 | Outstanding Performance |

|                        |                  |                     |         |                                       |
|------------------------|------------------|---------------------|---------|---------------------------------------|
| (50 - 100)             | B - Very Good    | جيد جدا             | 80 - 89 | Above average with some errors        |
|                        | C - Good         | جيد                 | 70 - 79 | Sound work with notable errors        |
|                        | D - Satisfactory | متوسط               | 60 - 69 | Fair but with major shortcomings      |
|                        | E - Sufficient   | مقبول               | 50 - 59 | Work meets minimum criteria           |
| Fail Group<br>(0 – 49) | FX – Fail        | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
|                        | F – Fail         | راسب                | (0-44)  | Considerable amount of work required  |
|                        |                  |                     |         |                                       |

| Module Information                 |                      |                               |                                                                                                                                                                                                                                                     |  |
|------------------------------------|----------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| معلومات المادة الدراسية            |                      |                               |                                                                                                                                                                                                                                                     |  |
| Module Title                       | Calculus             |                               | Module Delivery                                                                                                                                                                                                                                     |  |
| Module Type                        | Basic                |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |  |
| Module Code                        | RSGIS11004           |                               |                                                                                                                                                                                                                                                     |  |
| ECTS Credits                       | 6                    |                               |                                                                                                                                                                                                                                                     |  |
| SWL (hr/sem)                       | 150                  |                               |                                                                                                                                                                                                                                                     |  |
| Module Level                       | UGI                  | Semester of Delivery          | 1                                                                                                                                                                                                                                                   |  |
| Administering Department           | B                    | College                       | Type College Code                                                                                                                                                                                                                                   |  |
| Module Leader                      | علي عبد الكاظم رحيمه | e-mail                        |                                                                                                                                                                                                                                                     |  |
| Module Leader's Acad. Title        | مدرس                 | Module Leader's Qualification | M.Sc                                                                                                                                                                                                                                                |  |
| Module Tutor                       | Name (if available)  | e-mail                        | E-mail                                                                                                                                                                                                                                              |  |
| Peer Reviewer Name                 | Name                 | e-mail                        | E-mail                                                                                                                                                                                                                                              |  |
| Scientific Committee Approval Date | 1/10/2025            | Version Number                | 1.0                                                                                                                                                                                                                                                 |  |
| Relation with other Modules        |                      |                               |                                                                                                                                                                                                                                                     |  |
| العلاقة مع المواد الدراسية الأخرى  |                      |                               |                                                                                                                                                                                                                                                     |  |
| Prerequisite module                | None                 |                               | Semester                                                                                                                                                                                                                                            |  |

|                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |  |
|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--|
| <b>Co-requisites module</b>                                                                                               | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Semester</b> |  |
| <b>Module Aims, Learning Outcomes and Indicative Contents</b><br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |  |
| <b>Module Objectives</b><br>أهداف المادة الدراسية                                                                         | 1. Use functions and other pre-Calculus mathematics proficiently.<br>2. Calculate, use, and explain the concept of limits.<br>3. Explain and interpret the meaning of the derivative of a function.<br>4. Use shortcuts to calculate derivatives efficiently.<br>5. Use derivatives to solve authentic real-life application problems.<br>6. Use definite integrals and the Fundamental Theorem of Calculus to find areas and total change.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |  |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية                                                          | 7. Determine the existence of, estimate numerically and graphically, and find algebraically the limits of functions.<br>8. Recognize and determine infinite limits and limits at infinity and interpret with respect to asymptotic behavior.<br>9. Determine continuity at a point or on intervals and distinguish between the types of discontinuities at a point.<br>10. Determine the derivative of a function using the limit definition. Interpret the derivative as the slope of a tangent line to a graph, the slope of a graph at a point, and the rate of change of a dependent variable with respect to an independent variable.<br>11. Determine the derivative and higher derivatives of a function explicitly using differentiation formulas.<br>12. Determine derivatives implicitly<br>13. Solve related rates problems.<br>14. Determine absolute extrema for a continuous function on a closed interval. Use these and other appropriate techniques to solve optimization problems.<br>15. Use the first and second derivatives to analyze and sketch the graph of a function, including asymptotes, intervals on which the graph is increasing, decreasing, concave up, or concave down, and any local extrema and inflection points.<br>16. Determine antiderivatives and indefinite integrals and integrate by substitution.<br>17. Use the Fundamental Theorem of Calculus to evaluate definite integrals.<br>18. Use definite integrals to find areas of planar regions. |                 |  |
| <b>Indicative Contents</b><br>المحتويات                                                                                   | Indicative content includes the following.<br>Limits and Continuity Limit of a function, evaluation of limits, continuity.<br>1- Differentiation Derivative of a function, rules of differentiation, higher derivatives, L'Hôpital's                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |  |

|                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| الإرشادية                                                                                                                                 | <p>rule.</p> <p>2- Applications of Differentiation Maximum and minimum, rates of change, differentials, linear approximations, increasing and decreasing functions, curve sketching.</p> <p>3- Integration Integrals, techniques of integration, applications of integration.</p> <p>4- Ordinary Differential Equations First order equations, second order linear equations with constant coefficients.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p style="text-align: center;"><b>Learning and Teaching Strategies</b></p> <p style="text-align: center;">استراتيجيات التعلم والتعليم</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Strategies                                                                                                                                | <p>Here are some learning and teaching strategies that may be effective for a course on Digital image processing :</p> <ol style="list-style-type: none"> <li>1. Lectures: Lectures can provide an overview of key concepts and techniques in digital image processing.</li> <li>2. Education: provide lectures and printed sources from the modern, diverse and rich sources including examples</li> <li>3. Education: Harnessing smart blackboard to the goal of teaching students and explain the steps the solution and extraction results</li> <li>4. Education: resolving some questions, with intent to contain mistakes and make the students extracted error</li> <li>5. Learning: asking questions and inquiries and making the student turn into a teaching explanation and solution on the blackboard at that point, brainstorming method</li> <li>6. Learning: questions directly and consequently all students to learn the extent of interaction and the rest to be paid attention to</li> <li>7. Learning: Each specific group and explain its interaction between students with questions and answers and provide an environment that enables the student to lecture management or debate.</li> <li>8. Instructors can use slides, diagrams, and other visual aids to help students understand complex topics.</li> <li>9. Online resources: Online resources such as interactive tutorials, video lectures, and online forums can supplement classroom instruction and provide students with additional opportunities to learn image processing.</li> <li>10. Assessments: Assessments can help students measure their understanding of course material and provide instructors with feedback on the effectiveness of their teaching. Assessments can include quizzes, exams, and projects. By using a combination of these learning and teaching strategies, instructors can create a dynamic and engaging learning environment that helps students develop the knowledge and skills they need to succeed in the field of calculus.</li> </ol> |

| Student Workload (SWL)                                                  |                                                                                                                              |             |                                                                    |            |                           |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------|------------|---------------------------|
| الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا                                 |                                                                                                                              |             |                                                                    |            |                           |
| Structured SWL (h/sem)<br>الحمل الدراسي المنتظم للطالب خلال الفصل       |                                                                                                                              | 62          | Structured SWL (h/w)<br>الحمل الدراسي المنتظم للطالب أسبوعيا       |            | 4                         |
| Unstructured SWL (h/sem)<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |                                                                                                                              | 138         | Unstructured SWL (h/w)<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |            | 8                         |
| Total SWL (h/sem)<br>الحمل الدراسي الكلي للطالب خلال الفصل              |                                                                                                                              | 200         |                                                                    |            |                           |
| Module Evaluation                                                       |                                                                                                                              |             |                                                                    |            |                           |
| تقييم المادة الدراسية                                                   |                                                                                                                              |             |                                                                    |            |                           |
|                                                                         |                                                                                                                              | Time/Number | Weight (Marks)                                                     | Week Due   | Relevant Learning Outcome |
| Formative assessment                                                    | Quizzes                                                                                                                      | 2           | 10% (10)                                                           | 5 and 10   | LO #1, #2 and #10, #11    |
|                                                                         | Assignments                                                                                                                  | 2           | 10% (10)                                                           | 2 and 12   | LO #3, #4 and #6, #7      |
|                                                                         | Projects / Lab.                                                                                                              | 1           | 10% (10)                                                           | Continuous | All                       |
|                                                                         | Report                                                                                                                       | 1           | 10% (10)                                                           | 13         | LO #5, #8 and #10         |
| Summative assessment                                                    | Midterm Exam                                                                                                                 | 2hr         | 10% (10)                                                           | 7          | LO #1 - #7                |
|                                                                         | Final Exam                                                                                                                   | 3hr         | 50% (50)                                                           | 16         | All                       |
| Total assessment                                                        |                                                                                                                              |             | 100% (100 Marks)                                                   |            |                           |
| Delivery Plan (Weekly Syllabus)                                         |                                                                                                                              |             |                                                                    |            |                           |
| المنهاج الاسبوعي النظري                                                 |                                                                                                                              |             |                                                                    |            |                           |
|                                                                         | Material Covered                                                                                                             |             |                                                                    |            |                           |
| Week 1                                                                  | Chapter 1<br>1- Slope and equation of line<br>2- Function and their graphs<br>3- Shifts, circle and parabola                 |             |                                                                    |            |                           |
| Week 2                                                                  | Chapter 2<br>1- Limits<br>2- Limits involving infinity<br>3- Continues functions<br>4- Slopes, tangent lines and derivatives |             |                                                                    |            |                           |
| Week 3                                                                  | Chapter 2                                                                                                                    |             |                                                                    |            |                           |

|                |                                                                                                                                                                                                                                          |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | 5- Differentiation rule<br>6- Velocity, speed and other rate of change<br>7- Derivatives of trigonometric functions<br>8- Chain rule<br>9- Maxima, minima                                                                                |
| <b>Week 4</b>  | <b>Chapter 3</b><br>1- Definite integral<br>2- The fundamental theorem of integral calculus<br>3- Indefinite integral                                                                                                                    |
| <b>Week 5</b>  | <b>Chapter 3</b><br>4- Integration by substitution<br>5- A brief introduction to logarithms and exponential<br>6- Areas between curves, volumes of solids of revolution areas of surfaces of revolution                                  |
| <b>Week 6</b>  | <b>Chapter 4</b><br>1- Inverse function and their derivatives<br>2- $\ln(x)$ , $e^x$ , and logarithmic differentiation<br>3- Hospital rule<br>4- The inverse trigonometric functions<br>5- Derivative of inverse trigonometric functions |
| <b>Week 7</b>  | <b>Chapter 5</b><br>1- Basic integration formula<br>2- Integration by parts<br>3- Trigonometric integral                                                                                                                                 |
| <b>Week 8</b>  | <b>Chapter 5</b><br>4- Trigonometric substitution<br>5- Rational functions and partial fractions<br>6- Improper integrals                                                                                                                |
| <b>Week 9</b>  | <b>Chapter 5</b><br>Taylor's series and Maclaurin series                                                                                                                                                                                 |
| <b>Week 10</b> | <b>Chapter 6</b><br>1- Polar coordinate<br>2- Graphing in Polar coordinate<br>3- Integration in Polar coordinate                                                                                                                         |
| <b>Week 11</b> | Chapter 7 ( matrices )<br>1- Definition of matrix.<br>2- Equality, addition and multiplication of matrices.<br>3- Transpose of matrix.                                                                                                   |
| <b>Week 12</b> | Chapter 7 ( matrices )<br>4- Some types of matrices.<br>5- Determinant of matrix.                                                                                                                                                        |

|                |                                                                                              |
|----------------|----------------------------------------------------------------------------------------------|
|                | 6- Adjoint of matrix.                                                                        |
| <b>Week 13</b> | Chapter 7 ( matrices )<br>7- Inverse of matrix.<br>8- Solution of a set of linear equations. |
| <b>Week 14</b> | Chapter 7 ( matrices )<br>9- Eigenvalues and eigenvectors.                                   |
| <b>Week 15</b> | Course review, final project presentations, and exam preparation.                            |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                                |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                          | Text                                                                                                                                                                                    | Available in the Library? |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | Thomas' Calculus Joel R. Hass, Christopher E. Heil, Maurice D. Weir<br>14th Edition                                                                                                     | Yes                       |
| <b>Recommended Texts</b> | Solutions for Thomas Calculus 14th<br>George B. Thomas Jr.                                                                                                                              | No                        |
| <b>Websites</b>          | <a href="https://www.academia.edu/57466287/Thomas_calculus_14th_edition_hass_solutions_manual">https://www.academia.edu/57466287/Thomas_calculus_14th_edition_hass_solutions_manual</a> |                           |

### Grading Scheme

مخطط الدرجات

| Group                              | Grade                   | التقدير             | Marks %  | Definition                            |
|------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group</b><br>(50 - 100) | <b>A</b> - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                    | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                    | <b>C</b> - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                    | <b>D</b> - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                    | <b>E</b> - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group</b><br>(0 – 49)      | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                    | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                    |                         |                     |          |                                       |

| Module Information                                                      |                         |                               |                                                                                                                                                                                                                                                     |                                                                                                |
|-------------------------------------------------------------------------|-------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية                                                 |                         |                               |                                                                                                                                                                                                                                                     |                                                                                                |
| Module Title                                                            | Arabic Language I       |                               | Module Delivery                                                                                                                                                                                                                                     |                                                                                                |
| Module Type                                                             | B                       |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                                                                                                |
| Module Code                                                             | UOB101                  |                               |                                                                                                                                                                                                                                                     |                                                                                                |
| ECTS Credits                                                            | 2                       |                               |                                                                                                                                                                                                                                                     |                                                                                                |
| SWL (hr/sem)                                                            | 50                      |                               |                                                                                                                                                                                                                                                     |                                                                                                |
| Module Level                                                            | UGI                     | Semester of Delivery          | 1                                                                                                                                                                                                                                                   |                                                                                                |
| Administering Department                                                | S                       | College                       | Type College Code                                                                                                                                                                                                                                   |                                                                                                |
| Module Leader                                                           | Leqaa faleh owdaa flaih |                               | e-mail                                                                                                                                                                                                                                              | <a href="mailto:leqaa.falih@ircoedu.uobaghdad.edu.iq">leqaa.falih@ircoedu.uobaghdad.edu.iq</a> |
| Module Leader's Acad. Title                                             | Lecturer                | Module Leader's Qualification | Ph.D.                                                                                                                                                                                                                                               |                                                                                                |
| Module Tutor                                                            | Name (if available)     | e-mail                        | E-mail                                                                                                                                                                                                                                              |                                                                                                |
| Peer Reviewer Name                                                      | Name                    | e-mail                        | E-mail                                                                                                                                                                                                                                              |                                                                                                |
| Scientific Committee Approval Date                                      | 1/10/2025               | Version Number                | 1.0                                                                                                                                                                                                                                                 |                                                                                                |
| <b>Relation with other Modules</b><br>العلاقة مع المواد الدراسية الأخرى |                         |                               |                                                                                                                                                                                                                                                     |                                                                                                |
| Prerequisite module                                                     | None                    |                               | Semester                                                                                                                                                                                                                                            |                                                                                                |
| Co-requisites module                                                    | None                    |                               | Semester                                                                                                                                                                                                                                            |                                                                                                |

| Module Aims, Learning Outcomes and Indicative Contents   |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Module Objectives<br>أهداف المادة الدراسية               | 1- تعلم مهارات الكتابة والاملاء والتعبير الصحيح خلال تطبيق قواعد اللغة العربية بشكل مفصل وتطبيقي على نصوص عربية.<br>2- لفهم الجمع وأنواع الاسماء وكيفية التعامل معها.<br>3- لفهم العدد واستعماله بشكل صحيح من حيث المطابقة والمخالفة للتفريق بين الضاد والظاء.<br>4- للتفريق ومعرفة استعمال التاء المربوطة والتاء الطويلة.<br>5- التمييز بين العلامات الاصلية والفرعية.<br>6- تعلم استعمال الأدوات وعمل كل أداة ومعناها في التعبير. |

|                                             |                                                                                                                                                                                                                                                                                                                                 |                                          |   |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---|
| Module Learning Outcomes                    | هام: اكتب 6 مخرجات تعليمية على الأقل، ومن الأفضل أن تكون مساوية لعدد أسابيع الدراسة                                                                                                                                                                                                                                             |                                          |   |
| مخرجات التعلم للمادة الدراسية               | 1- التعرف على كيفية جمع الأسماء وأنواع الجموع وسبب اختلافها وقائمة بالمصطلحات المختلفة المرتبطة ببلاغة اللغة العربية تعلم كتابة الهمزة وانواعها.                                                                                                                                                                                |                                          |   |
|                                             | 2- وصف عمل الجمل الفعلية وأنواع الافعال                                                                                                                                                                                                                                                                                         |                                          |   |
|                                             | 3- ناقش وتفاعل ومشاركة قواعد الجمل الاسمية وعلامات الاعراب الاصلية والفرعية والتطبيقات ضمن نصوص أدبية وقرائية.                                                                                                                                                                                                                  |                                          |   |
|                                             | 4- القدرة على استعمال علامات الترقيم في كتابة البحوث والتقارير .                                                                                                                                                                                                                                                                |                                          |   |
|                                             | 5- التمييز بين الأدوات وأسلوب العطف والجر.                                                                                                                                                                                                                                                                                      |                                          |   |
|                                             | 6- التعرف على قواعد اللغة العربية الأساسية وتطبيقاتها.                                                                                                                                                                                                                                                                          |                                          |   |
| Indicative Contents                         | يتضمن المحتوى الإرشادي ما يلي.                                                                                                                                                                                                                                                                                                  |                                          |   |
| المحتويات الإرشادية                         | مقدمة في البداية التي أسس لها علماء اللغة العربية وكيف بدأت كتابة المؤلفات بالمعاجم والقواعد وجمع اللهجات واستقراء اللغة وحركة الترجمة والفتوحات وتطور اللغة.                                                                                                                                                                   |                                          |   |
|                                             | ومشكلات المراجعة (6 ساعات)                                                                                                                                                                                                                                                                                                      |                                          |   |
|                                             | ودراسة الجمل وانواعها والافعال والعلامات الاصلية والفرعية والعدد. ومشكلات الكتابة والاملاء التي يقع فيها الطلبة في التفرقة بين الضاد والطاء والتاء المربوطة والطويلة والهمزة وانواعها وكيفية كتابتها. (6ساعات)                                                                                                                  |                                          |   |
|                                             | ودراسة الموضوعات الصرفية التي تخص المشتقات من اسم الفاعل واسم المفعول وصيغة المبالغة واوزانها ومعانيها وصيغها السماعية والقياسية..                                                                                                                                                                                              |                                          |   |
|                                             | وعلامات الترقيم وكيفية توظيفها في كتابة التقارير والبحوث والمخطوطات.                                                                                                                                                                                                                                                            |                                          |   |
|                                             | (6ساعات)                                                                                                                                                                                                                                                                                                                        |                                          |   |
| Learning and Teaching Strategies            |                                                                                                                                                                                                                                                                                                                                 |                                          |   |
| استراتيجيات التعلم والتعليم                 |                                                                                                                                                                                                                                                                                                                                 |                                          |   |
| Strategies                                  | كتب شيئاً مثل: الاستراتيجية الرئيسية التي سيتم تبنيها في تقديم هذه الوحدة هي تشجيع الطلاب على المشاركة في التمارين، مع تحسين مهارات التفكير النقدي وتوسيعها في نفس الوقت. سيتم تحقيق ذلك من خلال الفصول والبرامج التعليمية التفاعلية ومن خلال النظر في أنواع التجارب البسيطة التي تتضمن بعض أنشطة أخذ العينات التي تهتم الطلاب. |                                          |   |
| Student Workload (SWL)                      |                                                                                                                                                                                                                                                                                                                                 |                                          |   |
| الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا     |                                                                                                                                                                                                                                                                                                                                 |                                          |   |
| Structured SWL (h/sem)                      | 60                                                                                                                                                                                                                                                                                                                              | Structured SWL (h/w)                     | 4 |
| الحمل الدراسي المنتظم للطلاب خلال الفصل     |                                                                                                                                                                                                                                                                                                                                 | الحمل الدراسي المنتظم للطلاب أسبوعيا     |   |
| Unstructured SWL (h/sem)                    | 30                                                                                                                                                                                                                                                                                                                              | Unstructured SWL (h/w)                   | 2 |
| الحمل الدراسي غير المنتظم للطلاب خلال الفصل |                                                                                                                                                                                                                                                                                                                                 | الحمل الدراسي غير المنتظم للطلاب أسبوعيا |   |
| Total SWL (h/sem)                           | 60                                                                                                                                                                                                                                                                                                                              |                                          |   |
| الحمل الدراسي الكلي للطلاب خلال الفصل       |                                                                                                                                                                                                                                                                                                                                 |                                          |   |

## Module Evaluation

### تقييم المادة الدراسية

|                      |                 | Time/Number | Weight (Marks)   | Week Due          | Relevant Learning Outcome |
|----------------------|-----------------|-------------|------------------|-------------------|---------------------------|
| Formative assessment | Quizzes         | 5/30        | 10% (10)         | 5 and 10          | LO #1, #2 and #10, #11    |
|                      | Assignments     | 6           | 10% (10)         | 2,3,6,8,10 and 12 | LO #3, #4 and #6, #7      |
|                      | Projects / Lab. |             | 10% (10)         | Continuous        | All                       |
|                      | Report          | 5           | 10% (10)         | 13                | LO #5, #8 and #10         |
| Summative assessment | Midterm Exam    | 2hr:        | 10% (10)         | 7                 | LO #1 - #7                |
|                      | Final Exam      | 3hr         | 50% (50)         | 16                | All                       |
| Total assessment     |                 |             | 100% (100 Marks) |                   |                           |

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

|         | Material Covered                        |
|---------|-----------------------------------------|
| Week 1  | علامات الترفيم والتنقيط والنواسخ        |
| Week 2  | المشتقات                                |
| Week 3  | الجملة الاسمية                          |
| Week 4  | الجملة الفعلية                          |
| Week 5  | الفرق بين الضاد والظاء                  |
| Week 6  | التاء المربوطة والتاء المفتوحة          |
| Week 7  | الهمزة وانواعها                         |
| Week 8  | العدد                                   |
| Week 9  | الجمع                                   |
| Week 10 | العلامات الاصلية والعلامات الفرعية      |
| Week 11 | اعلام عراقيون بدر شاكر السياب والجواهري |
| Week 12 | العطف                                   |
| Week 13 | حروف الجر                               |
| Week 14 | الاسم المؤنث والاسم المذكر              |
| Week 15 | الحذف والزيادة                          |
| Week 16 | الأسماء المنصوبة                        |

| Delivery Plan (Weekly Lab. Syllabus)                                                                                                                                                                                                                                                                                                                                                 |                                                                                         |                     |          |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------|----------|---------------------------------------|
| المنهاج الاسبوعي للمختبر                                                                                                                                                                                                                                                                                                                                                             |                                                                                         |                     |          |                                       |
|                                                                                                                                                                                                                                                                                                                                                                                      | Material Covered                                                                        |                     |          |                                       |
| Week 1                                                                                                                                                                                                                                                                                                                                                                               | المادة نظري /لا يوجد مختبر                                                              |                     |          |                                       |
| Learning and Teaching Resources                                                                                                                                                                                                                                                                                                                                                      |                                                                                         |                     |          |                                       |
| مصادر التعلم والتدريس                                                                                                                                                                                                                                                                                                                                                                |                                                                                         |                     |          |                                       |
|                                                                                                                                                                                                                                                                                                                                                                                      | Text                                                                                    |                     |          | Available in the Library?             |
| Required Texts                                                                                                                                                                                                                                                                                                                                                                       | جامع الدروس العربية وشرح ابن عقيل                                                       |                     |          | Yes                                   |
| Recommended Texts                                                                                                                                                                                                                                                                                                                                                                    | Electromagnetic theory (book). 2000.vol.1                                               |                     |          | yes                                   |
| Websites                                                                                                                                                                                                                                                                                                                                                                             | https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering |                     |          |                                       |
| Grading Scheme                                                                                                                                                                                                                                                                                                                                                                       |                                                                                         |                     |          |                                       |
| مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                                         |                                                                                         |                     |          |                                       |
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade                                                                                   | التقدير             | Marks %  | Definition                            |
| Success Group<br>(50 - 100)                                                                                                                                                                                                                                                                                                                                                          | A - Excellent                                                                           | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | B - Very Good                                                                           | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | C - Good                                                                                | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | D - Satisfactory                                                                        | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | E - Sufficient                                                                          | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 – 49)                                                                                                                                                                                                                                                                                                                                                               | FX – Fail                                                                               | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | F – Fail                                                                                | راسب                | (0-44)   | Considerable amount of work required  |
|                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                         |                     |          |                                       |
| <b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |                                                                                         |                     |          |                                       |

| Module Information |
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| معلومات المادة الدراسية            |                     |           |                                                                                                                                                                                                          |                   |       |
|------------------------------------|---------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------|
| Module Title                       | English Language I  |           | Module Delivery                                                                                                                                                                                          |                   |       |
| Module Type                        | Core                |           | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                   |       |
| Module Code                        | UOB102              |           |                                                                                                                                                                                                          |                   |       |
| ECTS Credits                       | 2                   |           |                                                                                                                                                                                                          |                   |       |
| SWL (hr/sem)                       | 50                  |           |                                                                                                                                                                                                          |                   |       |
| Module Level                       |                     | UGI       | Semester of Delivery                                                                                                                                                                                     |                   | 1     |
| Administering Department           |                     | S         | College                                                                                                                                                                                                  | Type College Code |       |
| Module Leader                      | دريد عبد السلام     |           | e-mail                                                                                                                                                                                                   |                   |       |
| Module Leader's Acad. Title        |                     | مدرس      | Module Leader's Qualification                                                                                                                                                                            |                   | Ph.D. |
| Module Tutor                       | Name (if available) |           | e-mail                                                                                                                                                                                                   | E-mail            |       |
| Peer Reviewer Name                 |                     | Name      | e-mail                                                                                                                                                                                                   | E-mail            |       |
| Scientific Committee Approval Date |                     | 1/10/2025 | Version Number                                                                                                                                                                                           |                   | 1.0   |

| Relation with other Modules                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |  |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--|
| العلاقة مع المواد الدراسية الأخرى                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |  |
| Prerequisite module                                      | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Semester |  |
| Co-requisites module                                     | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Semester |  |
| Module Aims, Learning Outcomes and Indicative Contents   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |  |
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |  |
| Module Objectives<br>أهداف المادة الدراسية               | <p>New Headway Beginner Plus is a Beginner course in English intended to provide students with the fundamentals of the language and a foundation at First Year students / college of science, moving towards a higher level of proficiency at this stage.</p> <p>1. Listening Objectives:</p> <ul style="list-style-type: none"> <li>Understand and respond to basic greetings, introductions, and simple instructions.</li> <li>Comprehend and extract information from short, simple spoken passages related to everyday topics.</li> <li>Identify and understand common vocabulary and expressions in spoken English.</li> </ul> |          |  |

|                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                 | <p>2. Speaking Objectives:</p> <ul style="list-style-type: none"> <li>Engage in basic conversations using simple greetings, introductions, and expressions related to personal information.</li> <li>Ask and answer simple questions about personal details, daily routines, and familiar topics.</li> <li>Participate in short dialogues and role-plays to practice communication skills.</li> </ul> <p>3. Reading Objectives:</p> <ul style="list-style-type: none"> <li>Read and comprehend simple texts, such as signs, labels, short passages, and dialogues.</li> <li>Recognize and understand basic vocabulary words and phrases in context.</li> <li>Extract information from texts related to everyday situations and topics.</li> </ul> <p>4. Writing Objectives:</p> <ul style="list-style-type: none"> <li>Write short sentences and paragraphs about personal information, experiences, and familiar topics.</li> <li>Fill out basic forms with personal details, such as name, age, and nationality.</li> <li>Write simple messages, notes, and emails related to everyday situations.</li> </ul> <p>5. Vocabulary and Grammar Objectives:</p> <ul style="list-style-type: none"> <li>Acquire a basic vocabulary related to common topics, such as greetings, numbers, time, family, food, and everyday objects.</li> <li>Understand and use basic grammatical structures, including present simple, present continuous, simple past, and basic question forms.</li> <li>Recognize and use common prepositions, articles, and basic sentence structures.</li> </ul> <p>6. Cultural Awareness Objectives:</p> <ul style="list-style-type: none"> <li>Develop an understanding of cultural customs and practices related to greetings, social norms, and everyday interactions in English-speaking countries.</li> <li>Gain exposure to cultural elements through reading or listening to texts about customs, traditions, and holidays.</li> </ul> |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم<br/>للمادة الدراسية</p> | <p>By the end of the course, the students will be able to:</p> <p>1. Listening and Speaking Skills:</p> <ul style="list-style-type: none"> <li>Understand and respond appropriately to basic questions and statements.</li> <li>Engage in simple conversations related to personal information, daily routines, and immediate surroundings.</li> <li>Follow simple instructions and directions.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   | <ul style="list-style-type: none"> <li>• Develop basic pronunciation and intonation skills.</li> </ul> <p>2. Reading Skills:</p> <ul style="list-style-type: none"> <li>• Recognize and understand basic vocabulary words and phrases in simple texts.</li> <li>• Comprehend and extract information from short, simple texts such as signs, notices, and labels.</li> <li>• Understand basic sentence structures and common grammatical patterns.</li> </ul> <p>3. Writing Skills:</p> <ul style="list-style-type: none"> <li>• Write simple sentences and short paragraphs about personal information, experiences, and familiar topics.</li> <li>• Fill out simple forms and write basic personal information.</li> <li>• Write simple messages, notes, and emails related to everyday situations.</li> </ul> <p>4. Vocabulary and Grammar:</p> <ul style="list-style-type: none"> <li>• Acquire and use a basic range of vocabulary related to everyday topics, such as greetings, numbers, time, family, food, and common objects.</li> <li>• Understand and use basic grammatical structures, including present simple, present continuous, simple past, and basic question forms.</li> <li>• Recognize and use common prepositions, articles, and basic sentence structures.</li> </ul> <p>5. Cultural Awareness:</p> <ul style="list-style-type: none"> <li>• Develop an understanding of cultural customs and practices related to greetings, social norms, and everyday interactions in English-speaking countries.</li> <li>• Gain exposure to cultural elements through reading or listening to texts about customs, traditions, and holidays.</li> </ul> |
| <b>Indicative Contents</b><br>المحتويات الإرشادية | <p>1. Use simple forms of polite expressions to establish basic social contact and to perform everyday functions including making requests and offers, conducting simple phone conversations, asking and telling time, giving simple directions, asking about price, ordering a meal, etc.</p> <p>2. Use a narrow range of positive and negative adjectives to describe objects, people and places.</p> <p>2.3. Exchange information by forming and responding to simple questions.</p> <p>3. Produce simple sentences using the correct word order and punctuation marks.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|  | <p>4. Use capital and lower case letters accurately in writing.</p> <p>5. Construct a short guided paragraph on a familiar topic concerning home, family, friends and holidays.</p> <p>5. Use the basic tenses including the present and past simple, and present continuous correctly.</p> <p>6. Use the basic auxiliary verbs (am/is/are/was/were/can) and a range of regular and irregular verbs.</p> <p>7. Demonstrate awareness of the essential grammatical features and functions including questions and negatives, plural nouns, frequency adverbs, possessives, pronouns and determiners.</p> |
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## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| Strategies | <p>1.Communicative Approach: Emphasize communicative activities that promote interaction among students. Encourage pair and group work, role-plays, and discussions to practice language skills in meaningful contexts.</p> <p>2.Integrated Skills: Integrate the four language skills (speaking, listening, reading, and writing) in lessons to create a balanced approach to language learning. Provide opportunities for students to use and develop these skills simultaneously.</p> <p>3.Vocabulary Expansion: Incorporate vocabulary-building exercises and activities throughout the course. Use real-life contexts, visuals, and practical examples to help students learn and remember new words.</p> <p>4.Grammar Focus: Teach and reinforce grammar structures in a systematic and progressive manner. Provide clear explanations, examples, and practice exercises to ensure students understand and can apply the grammar rules correctly.</p> <p>5.Authentic Materials: Include authentic texts, such as articles, newspaper clippings, songs, and videos, to expose students to real-world language usage. This helps develop their reading and listening comprehension skills and exposes them to cultural aspects of English-speaking countries.</p> <p>6.Cultural Awareness: Integrate cultural topics and discussions into the lessons to foster cultural awareness and sensitivity. Encourage students to share their own cultural backgrounds and experiences to promote understanding and appreciation of diverse perspectives.</p> <p>7.Error Correction: Provide constructive feedback and error correction during speaking and writing activities. Help students identify and correct their mistakes, focusing on accuracy while encouraging fluency and self-expression.</p> <p>8.Technology Integration: Utilize technology tools, such as interactive whiteboards, online resources, and language learning apps, to engage students and enhance their language learning experience. Incorporate multimedia materials for listening and speaking practice.</p> <p>9.Regular Assessment: Assess students' progress regularly through quizzes, tests, and assignments. Provide timely feedback to guide their learning and address areas that need improvement.</p> <p>10.Individualization: Cater to the individual needs and learning styles of students. Offer differentiated tasks and activities to ensure all learners are appropriately challenged and supported.</p> |
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|  | <p>11.Cooperative Learning: Promote collaboration and teamwork among students through pair work, group projects, and peer feedback. This encourages active participation and a supportive learning environment.</p> <p>12.Review and Revision: Schedule regular review sessions to consolidate previously learned material. Encourage students to revise and practice independently, providing resources for self-study and additional practice.</p> |
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### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |   |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 109 | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 7 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 91  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 6 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 200 |                                                                           |   |

### Module Evaluation

تقييم المادة الدراسية

|                             |                     | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|---------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>      | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>  | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects</b>     | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>       | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b> | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>   | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                     |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|               | Material Covered                                                                           |
|---------------|--------------------------------------------------------------------------------------------|
| <b>Week 1</b> | <p>Hello!</p> <p>p6</p> <p>am/are/is, my/your</p> <p>I'm Pablo.</p> <p>My name's Judy.</p> |

|               |                                                                                                                                                                                                                                                                                                                                                              |
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|               | <p>What's your name? p6</p> <p><b>This is ...</b></p> <p>This is Ben.</p> <p>Nice to meet you. p7</p>                                                                                                                                                                                                                                                        |
| <b>Week 2</b> | <p>Your world</p> <p>p12<b>he/she/they, his/her</b></p> <p>He's from the United States.</p> <p>Her name's Karima. p13</p> <p>They're on holiday. p16</p> <p>Questions</p> <p>What's his name?</p> <p>Where's she from? p13</p>                                                                                                                               |
| <b>Week 3</b> | <p>All about you</p> <p>p18</p> <p><b>am/are/is</b></p> <p>We're all singers. p20</p> <p>Negatives</p> <p>She isn't a nurse. p18</p> <p>I'm not from Scotland. p20</p> <p>They aren't builders. p20</p> <p>Questions</p> <p>What's her address? How old is she?</p> <p>Is she married? p19</p> <p>Short answers</p> <p>Yes, she is. / No, she isn't. p20</p> |
| <b>Week 4</b> | <p>Family and friends</p> <p>p24</p> <p><b>Possessive adjectives</b></p> <p>my, your, our, their p24</p> <p><b>Possessive 's</b></p> <p>Annie's husband Jim's office p24</p> <p><b>has/have</b></p> <p>I have a small hotel. She has a job.</p>                                                                                                              |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                            |
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|               | <p>We have three sons. p27</p> <p><b>Adjective + noun</b></p> <p>a small hotel a big house a good job p27apples, beer, bread, cake p36</p> <p><b>Shopping</b></p> <p>newsagent's, chemist's,<br/>off-licence p36</p> <p><b>Can you come for dinner?</b></p> <p>Would you like some<br/>more rice?</p> <p>Could you pass the<br/>salt, please?</p> <p>How would you like<br/>your coffee?</p> <p>This is delicious! p37</p> |
| <b>Week 5</b> | <p>The way I live<br/>p32</p> <p><b>Present Simple I/you/we/they</b></p> <p>I like ice-cream. I don't like tennis.</p> <p>Do you like football? p33</p> <p>Where do you work? Do you live in Dundee? p34</p> <p>In Brazil they speak Portuguese. p36</p> <p><b>a and an</b></p> <p>a waiter, an actor, an Italian restaurant p34</p> <p><b>Adjective + noun</b></p> <p>an American car Spanish oranges p37</p>             |
| <b>Week 6</b> | <p>Every day<br/>p40</p> <p><b>Present Simple he/she</b></p> <p>He gets up at 6.00.</p> <p>He has lunch in his office. p42</p> <p>She lives in a small house. p44</p> <p>Questions and negatives</p> <p>What time does he have breakfast?</p>                                                                                                                                                                              |

|                |                                                                                                                                                                                                                                                                         |
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|                | <p>He doesn't live in London. p43</p> <p><b>Adverbs of frequency</b></p> <p>He always works late.</p> <p>He never goes out. p42</p>                                                                                                                                     |
| <b>Week 7</b>  | Mid-term Exam                                                                                                                                                                                                                                                           |
| <b>Week 8</b>  | <p>My favourites</p> <p>p48</p> <p><b>Question words</b></p> <p>who, where, why, how p48</p> <p><b>Pronouns</b></p> <p>Subject/Object/Possessive</p> <p>I/me/my we/us/our they/them/ their p49</p> <p><b>this and that</b></p> <p>I like this wine. Who's that? p50</p> |
| <b>Week 9</b>  | <p>Where I live</p> <p>p56</p> <p><b>There is/are ...</b></p> <p>There's an old sofa.</p> <p>Are there any armchairs?</p> <p>There are some books. p57</p> <p><b>Prepositions</b></p> <p>in, on, under, next to p58</p>                                                 |
| <b>Week 10</b> | <p>Times past</p> <p>p64</p> <p><b>was/were born</b></p> <p>When were you born?</p> <p>I was born in 1996. p65</p> <p><b>Past Simple – irregular verbs</b></p> <p>went, came, saw</p> <p>She went shopping. p68</p>                                                     |
| <b>Week 11</b> | <p>We had a great time!</p> <p>p72</p> <p><b>Past Simple – regular and irregular</b></p>                                                                                                                                                                                |

|                |                                                                                                                                                                                                                                                                                                                                                                                           |
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|                | <p>played, got, watched, did p72</p> <p>Questions</p> <p>What did you do?</p> <p>Did you go out? p73</p> <p>Negatives</p> <p>They didn't go to work. p73</p> <p><b>ago</b></p> <p>I went to Rome ten years ago. p78</p>                                                                                                                                                                   |
| <b>Week 12</b> | <p>I can do that!</p> <p>p80</p> <p><b>can/can't</b></p> <p>He can speak French. I can't draw.</p> <p>Can she run fast? p80</p> <p><b>Adverbs</b></p> <p>I can cook a little bit. I can't cook at all.</p> <p>really well, fluently p82</p> <p><b>Requests and offers</b></p> <p>Can you tell me the time? Can I help you? p83</p>                                                        |
| <b>Week 13</b> | <p>Please and thank you</p> <p>p88</p> <p><b>I'd like ...</b></p> <p>I'd like some ham.</p> <p>How much would you like? p88</p> <p><b>some and any</b></p> <p>I'd like some cheese.</p> <p>Do you have any Emmental?</p> <p>I don't have any apple juice. p89</p> <p><b>like and would like</b></p> <p>I like Coke.</p> <p>I like going to the cinema.</p> <p>I'd like to go out. p91</p> |
| <b>Week 14</b> | <p>Here and now</p> <p>p96</p>                                                                                                                                                                                                                                                                                                                                                            |

|                                                                 |                                                                                                                                                                                                                                                                                                                   |                                  |                |                                |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------|--------------------------------|
|                                                                 | <b>Present Continuous</b><br>She’s wearing a T-shirt.<br>What’s he doing? p97<br><b>Present Simple and Present Continuous</b><br>He lives in London.<br>They’re staying in a hotel. p98                                                                                                                           |                                  |                |                                |
| <b>Week 15</b>                                                  | It’s time to go!<br>p104<br><b>Future plans</b><br>They’re going on holiday.<br>Which countries are you going to visit?<br>I’m leaving on Tuesday.<br>What are you doing this evening? p104<br><b>Revision</b><br>Question words – when, where, who, how p106<br>Tenses – present, past, and future tenses p110   |                                  |                |                                |
| <b>Week 16</b>                                                  | <b>Preparatory week before the final Exam</b>                                                                                                                                                                                                                                                                     |                                  |                |                                |
| <b>Learning and Teaching Resources</b><br>مصادر التعلم والتدريس |                                                                                                                                                                                                                                                                                                                   |                                  |                |                                |
|                                                                 | <b>Text</b>                                                                                                                                                                                                                                                                                                       | <b>Available in the Library?</b> |                |                                |
| <b>Required Texts</b>                                           | Soars, John and Liz, (2011), New Headway Plus, Special Edition, Beginner Level, Oxford University Press.                                                                                                                                                                                                          | Yes                              |                |                                |
| <b>Recommended Texts</b>                                        | New Headway Plus provides an integrated skills course with each unit divided into grammar, vocabulary, skills work and everyday English segments                                                                                                                                                                  | yes                              |                |                                |
| <b>Websites</b>                                                 | Oxford University Press: The New Headway series is published by Oxford University Press. Visit their website at <a href="http://www.oup.com">www.oup.com</a> and search for "New Headway Plus, Special Edition, Beginner Level " or browse their English language teaching section for information on the course. |                                  |                |                                |
| <b>Grading Scheme</b><br>مخطط الدرجات                           |                                                                                                                                                                                                                                                                                                                   |                                  |                |                                |
| <b>Group</b>                                                    | <b>Grade</b>                                                                                                                                                                                                                                                                                                      | <b>التقدير</b>                   | <b>Marks %</b> | <b>Definition</b>              |
| <b>Success Group (50 - 100)</b>                                 | <b>A – Excellent</b>                                                                                                                                                                                                                                                                                              | امتياز                           | 90 - 100       | Outstanding Performance        |
|                                                                 | <b>B - Very Good</b>                                                                                                                                                                                                                                                                                              | جيد جدا                          | 80 - 89        | Above average with some errors |

|                            |                         |                     |         |                                       |
|----------------------------|-------------------------|---------------------|---------|---------------------------------------|
|                            | <b>C – Good</b>         | جيد                 | 70 - 79 | Sound work with notable errors        |
|                            | <b>D – Satisfactory</b> | متوسط               | 60 - 69 | Fair but with major shortcomings      |
|                            | <b>E – Sufficient</b>   | مقبول               | 50 - 59 | Work meets minimum criteria           |
| <b>Fail Group (0 – 49)</b> | <b>FX – Fail</b>        | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
|                            | <b>F – Fail</b>         | راسب                | (0-44)  | Considerable amount of work required  |
|                            |                         |                     |         |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

| Module Information                |                            |           |                               |                                                      |       |
|-----------------------------------|----------------------------|-----------|-------------------------------|------------------------------------------------------|-------|
| معلومات المادة الدراسية           |                            |           |                               |                                                      |       |
| Module Title                      | Democracy and Human rights |           |                               | Module Delivery                                      |       |
| Module Type                       | Supplement                 |           |                               | Theory<br><br>Lecture<br><br>Tutorial<br><br>Seminar |       |
| Module Code                       | UOB104                     |           |                               |                                                      |       |
| ECTS Credits                      | 2                          |           |                               |                                                      |       |
| SWL (hr/sem)                      | 50                         |           |                               |                                                      |       |
| Module Level                      |                            | UGI       | Semester of Delivery          |                                                      | 1     |
| Administering Department          |                            | S         | College                       | Type College Code                                    |       |
| Module Leader                     | مهند احمد ياسين            |           | e-mail                        |                                                      |       |
| Module Leader's Acad. Title       |                            | Lecturer  | Module Leader's Qualification |                                                      | Ph.D. |
| Module Tutor                      | None                       |           | e-mail                        | None                                                 |       |
| Peer Reviewer Name                |                            |           | e-mail                        |                                                      |       |
| Review Committee Approval         |                            | 1/10/2025 | Version Number                | 1.0                                                  |       |
| Relation With Other Modules       |                            |           |                               |                                                      |       |
| العلاقة مع المواد الدراسية الأخرى |                            |           |                               |                                                      |       |
| Prerequisite module               | None                       |           |                               | Semester                                             |       |

|                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |  |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--|
| <b>Co-requisites module</b>                                                                                               | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Semester</b> |  |
| <b>Module Aims, Learning Outcomes and Indicative Contents</b><br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |  |
| <b>Module Aims</b><br>أهداف المادة الدراسية                                                                               | <p>1.This course deals with the basic concept of human rights&amp; democracy</p> <p>2.Clarifying and training students on the most important principles of human rights and democracy.</p> <p>3.Organizing discussions and presentations on the most vital and basic topics affecting community building, related to human rights and democracy..</p> <p>4.Adopting teamwork with students to develop their cognitive abilities and create a spirit of cooperation, initiative, creativity and exchange of views in an effort to build the foundations of peaceful community coexistence.</p> <p>5.Providing society with conscious youth aware of the importance of its role in building society, its unity and cohesion through spreading the culture of human rights and establishing the rules of correct democracy.</p> <p>6.Human rights guarantee the protection and respect of an individual's interests, even when he or she is not a majority. In a democratic climate, sustainable democratic power cannot be conceived without respecting, protecting and fulfilling human rights. Through their combined influence, they allow the individual a life based on the freedom of self-determination and collective. That is why the protection and realization of human rights truly form the basis of the democratic project.</p> |                 |  |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية                                                          | <p>Cognitive goals.</p> <p>10. Educate students and inform them about the importance of human rights and democracy.</p> <p>11. Recognize and understand the methods of teamwork for the exchange of ideas and creative discussions</p> <p>12. Developing students' performance through guidance in preparing mini-research on modern vocabulary on vital topics related to human rights and democracy.</p> <p>13. Providing students with creative development abilities in modern proposals and creative developmental ideas by discussing awareness videos presented on electronic classes.</p> <p>14. Developing the skills of sharing opinions and ideas and respecting others opinion.</p> <p>15. Objective Skills :</p> <p>16. Basic knowledge in the principles of human rights and democracy.</p> <p>17. Building the innovative personality of knowledge through online research and the transfer and exchange of information.</p> <p>18. Discuss the various properties about everything related to human rights and their importance in our daily lives.</p>                                                                                                                                                                                                                                                                     |                 |  |

|                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                    |      |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------|
|                                                                         | 19. Identify everything related to democracy and the foundations of the performance of the electoral process and its importance in building the nation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                    |      |
|                                                                         | 20. Identify the capacitor and inductor phasor relationship with respect to voltage and current.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                    |      |
| Indicative Contents<br>المحتويات الإرشادية                              | <div>- Developing the student's analytical and critical skills regarding the reality and future of human rights and democracy</div> <div>- Training the student on the importance of active participation in aspects of public life, such as promoting respect for the principles of public human rights and active participation in political and cultural life.</div> <div>- Enable students to understand the importance of education and its role in spreading the culture of human rights and democracy in building a civilized society based on good governance, the most important component of which is belief in human rights, education and active participation in governance through free and fair elections.</div>                                                                                                                                                                                                                        |                                                                    |      |
| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                    |      |
| Strategies                                                              | <div>The main strategy that will be adopted in delivering this module is to encourage students’ participation in the discussions, dialogues and group work lectures &amp; exercises, while at the same time refining and expanding their critical thinking skills. There are many teaching and learning methods used, and the most important of these methods are:</div> <div>Theoretical lecture, discussion and dialogue, panel discussions on certain topics, theoretical student research</div> <div>Library and electronic activities (which helps students to reach the following results:</div> <div>1- The scientific ability to distinguish between correct information and wrong information.</div> <div>2- Ease of scientific drafting and ease of correction.</div> <div>3. Ability to memorize and guess.</div> <div>4- The ability to link concepts and principles with reality.</div> <div>5. Ability to invoke, link, interpret.</div> |                                                                    |      |
| Student Workload (SWL)<br>الحمل الدراسي للطالب                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                    |      |
| Structured SWL (h/sem)<br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 32                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Structured SWL (h/w)<br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 2    |
| Unstructured SWL (h/sem)<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Unstructured SWL (h/w)<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 1.25 |
| Total SWL (h/sem)<br>الحمل الدراسي الكلي للطالب خلال الفصل              | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                    |      |

## Module Evaluation

### تقييم المادة الدراسية

|                      |                    | Time/Number | Weight (Marks)   | Week Due | Relevant Learning Outcome |
|----------------------|--------------------|-------------|------------------|----------|---------------------------|
| Formative assessment | Quizzes            | 2           | 10% (10)         | 5, 10    | LO #1, 2, 10 and 11       |
|                      | Assignments        | 2           | 10% (10)         | 2, 12    | LO # 3, 4, 6 and 7        |
|                      | Attending lectures | 1           | 1%               | 1.5      | 41#15 weeks               |
|                      | Report             | 1           | 10% (10)         | 13       | LO # 5, 8 and 10          |
| Summative assessment | Midterm Exam       | 2 hr        | 10% (10)         | 7        | LO # 1-7                  |
|                      | Final Exam         | 2hr         | 50% (50)         | 16       | All                       |
| Total assessment     |                    |             | 100% (100 Marks) |          |                           |

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري مادة حقوق الانسان و الديمقراطية

|        |                                                                                                                                                                                                                                                                                                                                              |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | Material Covered <b><u>Human rights &amp; Democracy</u></b>                                                                                                                                                                                                                                                                                  |
| Week 1 | Familiarity with the concept of human rights and the definitions approaching it, discussing, dismantling and criticizing them in a scientific way in order to reach the most accurate and objective. - Definition of right , of human, of the concept of human rights. Human rights qualities, Types of human rights Human Rights Categories |
| Week 2 | The historical development of human rights: Orcagina Reforms 1- Urnamo Law.2- The law of Ishtar Bit. 3- The law of the Kingdom of Eshnuna.4- Code of Hammurabi.                                                                                                                                                                              |
| Week 3 | Human rights in other ancient civilizations: 1- Indian and Chinese civilization 2-Pharaonic civilization of Egypt 3- Greek civilization 4- Roman civilization                                                                                                                                                                                |
| Week 4 | Human rights in heavenly laws<br>Human Rights in Judaism, Human rights in Christianity, Human Rights in Islam.                                                                                                                                                                                                                               |
| Week 5 | Human rights in Renaissance - modern and contemporary societies<br>Introducing the student to the most important UN document in the field of human rights, which was approved and approved by the Assembly on January 10, 1948<br>Universal Declaration of Human Rights 1948.                                                                |
| Week 6 | Non-governmental organizations defending human rights: Amnesty International, b. International Committee of the Red Cross. Arab Organization for Human Rights.                                                                                                                                                                               |
| Week 7 | Definition of the phenomenon of administrative corruption, Types of administrative corruption, Causes of administrative corruption. The repercussions of the phenomenon of administrative corruption on human rights and society. Successful treatments to combat corruption and protect society from it.                                    |

|                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Week 8                                                                  | Introduction - Historical development of the concept of <u>democracy</u> , definition of democracy, freedom. The difference between freedom and democracy, The relationship between the rights and public freedoms of individuals and democracy, Islamic views in a democratic system of government , Shura and Democratic System                                                                                                                                                                                                                                        |
| Week 9                                                                  | Specifications and duties of the Islamic ruler reading, The era of Imam Ali "peace be upon him" to his governor over Egypt: Specifications of the Islamic ruler: First: The moral and doctrinal components of the ruler Second: The general culture of the Islamic ruler, Third: Acumen and good choice: -Fourth: Direct relationship with people: Fourth: Direct relationship with people.<br><br>Duties of the Islamic ruler:<br><br>First: Social Reform: Second: Achieving security and defense<br><br>Third: The architecture of the country "economic development" |
| Week 10                                                                 | Forms of democracy: (1): Direct democracy ,(2): Semi-direct democracy ,<br>(3): Parliamentary democracy (parliamentary representation)4): Liberal Democracy<br>(5): consociation Democracy, (6): Delegated Democracy.                                                                                                                                                                                                                                                                                                                                                    |
| Week 11                                                                 | Conditions for the success of the elements and pillars of the democratic system<br><br>General conditions for the success of the democratic system: 1. Respect for human rights, 2. Political pluralism 3. Peaceful transfer of power 4. Political equality 5. Respect the principle of the majority 6. Existence of the rule of law.                                                                                                                                                                                                                                    |
| Week 12                                                                 | Components or elements of democracy:<br><br>1 – Citizenship 2- Political participation 3. Elections 4. MPs and Responsibility<br><br>5. Opposition 6- Separation of government and parliament 7- Constitutional legitimacy                                                                                                                                                                                                                                                                                                                                               |
| Week 13                                                                 | The concept of elections and their legal adaptation: First: The concept of election<br><br>Second: Legal adaptation of the Election, Third: Conditions of Election, Fourth: Concepts of Elections, Fifth: Types of Electoral Systems. Assessing the Democratic System, Pros and advantages of the democratic system, Disadvantages and disadvantages of the democratic system, Implementing the democratic system in Iraq.                                                                                                                                               |
| Week 14                                                                 | Lobbyists: First: the concept and definition. Second: Types of pressure groups. Third: The methods of pressure groups that they use to achieve their goals.<br><br>Fourth: Lobbying and Democracy.                                                                                                                                                                                                                                                                                                                                                                       |
| Week 15                                                                 | Preparatory Week                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Week 16                                                                 | Final Exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي للمختبر |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                         | Material Covered                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Week 1                                                                  | لا يوجد                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Learning and Teaching Resources</b>                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## مصادر التعلم والتدريس

|                          | Text                                                                                                                                                                                                                                                                                                                        | Available in the Library? |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | <p>Martyrdom verses from the Holy Quran</p> <p>Mohammed Al-Tarawneh et al., International Humanitarian Law, ICRC, Amman, 2005</p> <p>Diamond Larry, Democracy: Its Development and Ways to Enhance It, translated by Fawzia Naji, Dar Al-Mamoun for Translation, Iraq, 2005.</p>                                            | Yes                       |
| <b>Recommended Texts</b> | <p>journal.un.org</p> <p>Hadi, Riad Azabz. (2005). Human rights (evolving contents and protection) (Baghdad).</p>                                                                                                                                                                                                           | Yes                       |
| <b>Websites</b>          | <p><a href="#">Universal Declaration of Human Rights   United Nations</a></p> <p><a href="https://sc.uobaghdad.edu.iq/?page_id=8415">https://sc.uobaghdad.edu.iq/?page_id=8415</a></p> <p><a href="https://www.youtube.com/@ansamalobidimanagerofhuman2891">https://www.youtube.com/@ansamalobidimanagerofhuman2891</a></p> |                           |

## GRADING SCHEME

### مخطط الدرجات

| Group                              | Grade                   | التقدير     | Marks (%) | Definition                            |
|------------------------------------|-------------------------|-------------|-----------|---------------------------------------|
| <b>Success Group</b><br>(50 - 100) | <b>A</b> - Excellent    | امتياز      | 90 - 100  | Outstanding Performance               |
|                                    | <b>B</b> - Very Good    | جيد جدا     | 80 - 89   | Above average with some errors        |
|                                    | <b>C</b> - Good         | جيد         | 70 - 79   | Sound work with notable errors        |
|                                    | <b>D</b> - Satisfactory | متوسط       | 60 - 69   | Fair but with major shortcomings      |
|                                    | <b>E</b> - Sufficient   | مقبول       | 50 - 59   | Work meets minimum criteria           |
| <b>Fail Group</b><br>(0 – 49)      | <b>FX</b> – Fail        | مقبول بقرار | (45-49)   | More work required but credit awarded |
|                                    | <b>F</b> – Fail         | راسب        | (0-44)    | Considerable amount of work required  |
|                                    |                         |             |           |                                       |

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

(المرحلة الاولى/الفصل الثاني)

# MODULE DESCRIPTOR FORM

## نموذج وصف المادة الدراسية

| Module Information          |                 |                      |                                                                                                                                                                                                          |      |
|-----------------------------|-----------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| معلومات المادة الدراسية     |                 |                      |                                                                                                                                                                                                          |      |
| Module Title                | Cartography     |                      | Module Delivery                                                                                                                                                                                          |      |
| Module Type                 | Core            |                      | <input checked="" type="checkbox"/> Theory<br><input type="checkbox"/> Lecture<br><input type="checkbox"/> Tutorial<br><input checked="" type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |      |
| Module Code                 | RSGIS12005      |                      |                                                                                                                                                                                                          |      |
| ECTS Credits                | 6               |                      |                                                                                                                                                                                                          |      |
| SWL (hr/sem)                | 150             |                      |                                                                                                                                                                                                          |      |
| Module Level                | UGI             | Semester of Delivery | 2                                                                                                                                                                                                        |      |
| Administering Department    | Type Dept. Code | College              | Type College Code                                                                                                                                                                                        |      |
| Module Leader               | احلام علي حسين  |                      | e-mail                                                                                                                                                                                                   |      |
| Module Leader's Acad. Title | مدرس            |                      | Module Leader's Qualification                                                                                                                                                                            | Ph.D |
| Module Tutor                | None            |                      | e-mail                                                                                                                                                                                                   | None |
| Peer Reviewer Name          |                 |                      | e-mail                                                                                                                                                                                                   |      |
| Review Committee Approval   | 10/3/2026       |                      | Version Number                                                                                                                                                                                           | 1.0  |

| Relation With Other Modules                              |                                                                                                                                                                         |          |  |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--|
| العلاقة مع المواد الدراسية الأخرى                        |                                                                                                                                                                         |          |  |
| Prerequisite module                                      | None                                                                                                                                                                    | Semester |  |
| Co-requisites module                                     | None                                                                                                                                                                    | Semester |  |
| Module Aims, Learning Outcomes and Indicative Contents   |                                                                                                                                                                         |          |  |
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                         |          |  |
| Module Aims<br>أهداف المادة                              | This course is designed to provide the knowledge and skills for understanding the process of map making, and to acquaint students with new technology use in map making |          |  |

|                                             |                                                                                                                                                                                                                                                                                                                                                           |                                          |   |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---|
| الدراسية                                    | 7.This course deals with the basic concept of cartography                                                                                                                                                                                                                                                                                                 |                                          |   |
|                                             | 8.Clarifying and training students on the map design.                                                                                                                                                                                                                                                                                                     |                                          |   |
| Module Learning Outcomes                    | The learning outcomes:                                                                                                                                                                                                                                                                                                                                    |                                          |   |
| مخرجات التعلم للمادة الدراسية               | 21. Gain knowledges with the map projection, generalization, map symbolization, color theory, thematic map design.                                                                                                                                                                                                                                        |                                          |   |
|                                             | 22. Be able to abstract geographical phenomena, spatial cognition and thinking                                                                                                                                                                                                                                                                            |                                          |   |
|                                             | 23. Be skilled to collect, processing and generalization of spatial data                                                                                                                                                                                                                                                                                  |                                          |   |
|                                             | 24. Enable to use commercial software and open source tools to produce maps.                                                                                                                                                                                                                                                                              |                                          |   |
|                                             | 25. The students will be able to apply the techniques and principles of map making and designing for map creation and be able to read and coordinate various sheets for making mosaic.                                                                                                                                                                    |                                          |   |
| Indicative Contents                         | The course combines theory with experiment, with many contents but insufficient class time. The teaching in classroom mainly focuses on important concepts and problems, adopts new teaching methods such as flipped classroom, theme discussion and work competition to facilitate students ' interest.                                                  |                                          |   |
| المحتويات الإرشادية                         | Lab Practice Teaching Activities provide sufficient time for lab exercises. Through the study of basic content, with lab exercises, to improve students ' map producing ability.                                                                                                                                                                          |                                          |   |
| Learning and Teaching Strategies            |                                                                                                                                                                                                                                                                                                                                                           |                                          |   |
| استراتيجيات التعلم والتعليم                 |                                                                                                                                                                                                                                                                                                                                                           |                                          |   |
| Strategies                                  | The main strategy that will be adopted in delivering this module is to encourage students' participation in the discussions, dialogues and group work lectures & exercises, while at the same time refining and expanding their critical thinking skills. There are many teaching and learning methods used, and the most important of these methods are: |                                          |   |
|                                             | Theoretical lecture, discussion and dialogue, panel discussions on certain topics, theoretical student research                                                                                                                                                                                                                                           |                                          |   |
|                                             | Library and electronic activities                                                                                                                                                                                                                                                                                                                         |                                          |   |
| Student Workload (SWL)                      |                                                                                                                                                                                                                                                                                                                                                           |                                          |   |
| الحمل الدراسي للطالب                        |                                                                                                                                                                                                                                                                                                                                                           |                                          |   |
| Structured SWL (h/sem)                      | 60                                                                                                                                                                                                                                                                                                                                                        | Structured SWL (h/w)                     | 4 |
| الحمل الدراسي المنتظم للطالب خلال الفصل     |                                                                                                                                                                                                                                                                                                                                                           | الحمل الدراسي المنتظم للطالب أسبوعيا     |   |
| Unstructured SWL (h/sem)                    | 90                                                                                                                                                                                                                                                                                                                                                        | Unstructured SWL (h/w)                   | 6 |
| الحمل الدراسي غير المنتظم للطالب خلال الفصل |                                                                                                                                                                                                                                                                                                                                                           | الحمل الدراسي غير المنتظم للطالب أسبوعيا |   |
| Total SWL (h/sem)                           | 150                                                                                                                                                                                                                                                                                                                                                       |                                          |   |
| الحمل الدراسي الكلي للطالب خلال الفصل       |                                                                                                                                                                                                                                                                                                                                                           |                                          |   |
| Module Evaluation                           |                                                                                                                                                                                                                                                                                                                                                           |                                          |   |

## تقييم المادة الدراسية

|                             |                           | Time/Number | Weight (Marks)   | Week Due | Relevant Learning Outcome |
|-----------------------------|---------------------------|-------------|------------------|----------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>            | 2           | 10% (10)         | 5, 10    | LO #1, 2, 10 and 11       |
|                             | <b>Assignments</b>        | 2           | 10% (10)         | 2, 12    | LO # 3, 4, 6 and 7        |
|                             | <b>Attending lectures</b> | 1           | 1%               | 1.5      | 41#15 weeks               |
|                             | <b>Report</b>             | 1           | 10% (10)         | 13       | LO # 5, 8 and 10          |
| <b>Summative assessment</b> | <b>Midterm Exam</b>       | 2 hr        | 10% (10)         | 7        | LO # 1-7                  |
|                             | <b>Final Exam</b>         | 2hr         | 50% (50)         | 16       | All                       |
| <b>Total assessment</b>     |                           |             | 100% (100 Marks) |          |                           |

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري مادة رسم الخرائط

|               |                                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------|
|               | <b>Material Covered</b> <u><b>Cartography</b></u>                                                                                        |
| <b>Week 1</b> | <b>Unit – 1</b><br>1.1 Introduction to cartography, nature and scope of cartography                                                      |
| <b>Week 2</b> | 1.2 Digital cartography - elements of digital cartography Relation between digital Cartography, RS & GIS                                 |
| <b>Week 3</b> | 1.3 Conventional mapping VS Digital mapping<br>1.4 Scale, reference and coordinate system                                                |
| <b>Week 4</b> | <b>Unit – 2</b><br>2.1 Cartographic transformations and reasons for transforming cartographic data                                       |
| <b>Week 5</b> | 2.2 Map Projection – concept and classification<br>2.3 Azimuthal, cylindrical, conical and rectangular projection system                 |
| <b>Week 6</b> | 2.4 Choice of map projection – Satellite image and map projection                                                                        |
| <b>Week 7</b> | <b>Unit – 3</b><br>3.1 Mechanics of map construction - Principles of drawing, Base materials -Instruments                                |
| <b>Week 8</b> | 3.2 Cartographic design - map design principles, symbolisation and lay out                                                               |
| <b>Week 9</b> | 3.3 Study of different types of maps, Survey of Iraq maps, layout and Numbering of topographical maps<br>3.4 Thematic maps and base maps |

|                |                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------|
| <b>Week 10</b> | <b>Unit – 4</b><br>4.1 Representation of natural and cultural features, relief representations                   |
| <b>Week 11</b> | 4.2 Map digitization and Map Compilation<br>4.3 Fair drawing and editing of maps<br>4.4 Map reproduction process |
| <b>Week 12</b> | <b>Unit – 5</b><br>5.1 Introduction to Global Positioning System (GPS) – Fundamental concepts                    |
| <b>Week 13</b> | 5.2 GPS system elements and signals                                                                              |
| <b>Week 14</b> | 5.3 GPS measurements and accuracy of GPS<br>5.4 Classification of GPS receivers                                  |
| <b>Week 15</b> | <b>Preparatory Week</b>                                                                                          |
| <b>Week 16</b> | <b>Final Exam</b>                                                                                                |

| Delivery Plan (Weekly Lab. Syllabus) |                                                                                                                                                                                |                           |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| المنهاج الاسبوعي للمختبر             |                                                                                                                                                                                |                           |
|                                      | Material Covered                                                                                                                                                               |                           |
| Week 1                               | Introduction to QGIS                                                                                                                                                           |                           |
| Week 2                               | Definition of the toolbar and menu bar in QGIS                                                                                                                                 |                           |
| Week 3                               | How to create shape files and draw a map                                                                                                                                       |                           |
| Week 4                               | Product a new map from a satellite image                                                                                                                                       |                           |
| Week 5                               | Drawing a polyline map on the shape file                                                                                                                                       |                           |
| Week 6                               | How to edit the map properties                                                                                                                                                 |                           |
| Week 7                               | EXAM                                                                                                                                                                           |                           |
| Learning and Teaching Resources      |                                                                                                                                                                                |                           |
| مصادر التعلم والتدريس                |                                                                                                                                                                                |                           |
|                                      | Text                                                                                                                                                                           | Available in the Library? |
| Required Texts                       | 1) Anji Reddy, M. 2004: Geoinformatics for environmental management.B.S. Publications<br><br>2) Mishra R.P and Ramesh A. 1989: Fundamentals of Cartography. Concept publishing | Yes                       |

|                          |                                                                                                                                                                                                                                                                                                                                                             |     |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Recommended Texts</b> | 1) company Nag P. and Kudrat M. 1998: Digital Remote Sensing. Concept Publication<br>2) Rampal K.K. 1993: Mapping and compilation. Concept publication<br>3) Robinson A., Morrison, J.L., Muehrcke P.C., Guptil S.C. 2002: Elements of Cartography.<br>4) John Wiley Taylor,D.R.F. 1985: Education and Training in contemporary cartography,<br>John Willey | Yes |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|

|                 |  |
|-----------------|--|
| <b>Websites</b> |  |
|-----------------|--|

|                                       |
|---------------------------------------|
| <b>GRADING SCHEME</b><br>مخطط الدرجات |
|---------------------------------------|

| Group                               | Grade                   | التقدير     | Marks (%) | Definition                            |
|-------------------------------------|-------------------------|-------------|-----------|---------------------------------------|
| <b>Success Group<br/>(50 - 100)</b> | <b>A</b> - Excellent    | امتياز      | 90 - 100  | Outstanding Performance               |
|                                     | <b>B</b> - Very Good    | جيد جدا     | 80 - 89   | Above average with some errors        |
|                                     | <b>C</b> - Good         | جيد         | 70 - 79   | Sound work with notable errors        |
|                                     | <b>D</b> - Satisfactory | متوسط       | 60 - 69   | Fair but with major shortcomings      |
|                                     | <b>E</b> - Sufficient   | مقبول       | 50 - 59   | Work meets minimum criteria           |
| <b>Fail Group<br/>(0 – 49)</b>      | <b>FX</b> – Fail        | مقبول بقرار | (45-49)   | More work required but credit awarded |
|                                     | <b>F</b> – Fail         | راسب        | (0-44)    | Considerable amount of work required  |
|                                     |                         |             |           |                                       |

**Note:**

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

| <b>Module Information</b><br>معلومات المادة الدراسية |                              |                                                   |
|------------------------------------------------------|------------------------------|---------------------------------------------------|
| <b>Module Title</b>                                  | <b>Environmental Science</b> | <b>Module Delivery</b>                            |
| <b>Module Type</b>                                   | <b>Core</b>                  | <input checked="" type="checkbox"/> <b>Theory</b> |
| <b>Module Code</b>                                   | <b>RSGIS12006</b>            |                                                   |

|                                    |                           |                                                                                                                                                                                                       |                                     |
|------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| ECTS Credits                       | 6                         | <input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                                     |
| SWL (hr/sem)                       | 150                       |                                                                                                                                                                                                       |                                     |
| Module Level                       | UGI                       | Semester of Delivery                                                                                                                                                                                  | 2                                   |
| Administering Department           | Type Dept. Code           | College                                                                                                                                                                                               | Type College Code                   |
| Module Leader                      | Sundus A.Abdullah Albakry | e-mail                                                                                                                                                                                                | sundus.abdullah@sc.uobaghdad.edu.iq |
| Module Leader's Acad. Title        | Professor                 | Module Leader's Qualification                                                                                                                                                                         | Ph.D.                               |
| Module Tutor                       | Name (if available)       | e-mail                                                                                                                                                                                                | E-mail                              |
| Peer Reviewer Name                 | Sundus A.Abdullah Albakry | e-mail                                                                                                                                                                                                | sundus.abdullah@sc.uobaghdad.edu.iq |
| Scientific Committee Approval Date | 10/3/2026                 | Version Number                                                                                                                                                                                        | 1.0                                 |

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                      |      |          |  |
|----------------------|------|----------|--|
| Prerequisite module  | None | Semester |  |
| Co-requisites module | None | Semester |  |

### Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية | <ol style="list-style-type: none"> <li>Understand the scientific principles and concepts that underlie environmental science, including ecological systems, biogeochemical cycles, and environmental economics.</li> <li>Identify and describe the major environmental challenges facing the planet, such as climate change, biodiversity loss, pollution, and resource depletion.</li> <li>Analyze the impacts of human activities on the environment, including the use of natural resources, land use change, industrial and agricultural practices, and urbanization.</li> <li>Evaluate the effectiveness of different policies and strategies to address environmental issues, such as pollution control, conservation, and renewable energy development.</li> <li>Explore the ethical and social dimensions of environmental issues, including environmental justice, sustainability, and the role of individuals and communities in promoting environmental stewardship.</li> <li>Develop critical thinking and problem-solving skills through interdisciplinary approaches to environmental issues, incorporating perspectives from science, economics, policy, and social science.</li> <li>Demonstrate effective communication skills through written and oral presentations of environmental science research, data analysis, and policy analysis.</li> </ol> |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                      | <ol style="list-style-type: none"> <li>8. Apply quantitative methods and analytical tools to environmental science research, such as statistical analysis, modeling, and GIS mapping.</li> <li>9. Engage with current debates and controversies in environmental science, such as the role of technology in addressing environmental challenges, the relationship between economic growth and environmental sustainability, and the trade-offs between conservation and development.</li> <li>10. Develop a deep appreciation for the complexity and interconnectedness of ecological systems, and the importance of interdisciplinary approaches to understanding and addressing environmental issues.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Module Learning Outcomes</b><br><br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"> <li>1. Demonstrate a comprehensive understanding of key environmental science concepts and principles, including ecosystem dynamics, biogeochemical cycles, and sustainable development.</li> <li>2. Analyze the causes and consequences of major global environmental challenges, such as climate change, biodiversity loss, and pollution, using interdisciplinary approaches that draw on science, economics, and policy.</li> <li>3. Evaluate the effectiveness of different policy and management strategies for addressing environmental issues, including traditional regulatory approaches, market-based mechanisms, and community-based conservation programs.</li> <li>4. Apply quantitative methods and analytical tools to environmental science research, such as statistical analysis, modeling, and geographic information systems (GIS) mapping.</li> <li>5. Communicate environmental science research findings and recommendations effectively through written and oral presentations, using appropriate scientific and technical language and visual aids.</li> <li>6. Assess the ethical and social dimensions of environmental issues, including environmental justice, equity, and the role of indigenous knowledge and traditional ecological knowledge.</li> <li>7. Evaluate the impact of environmental policies and actions on different populations, including vulnerable groups and future generations, and propose strategies for promoting social and environmental justice.</li> <li>8. Engage in collaborative problem-solving and decision-making processes related to environmental issues, using effective communication, critical thinking, and conflict resolution skills.</li> <li>9. Develop a deep appreciation for the complexity and interconnectedness of natural systems and the importance of interdisciplinary approaches to understanding and addressing environmental challenges.</li> <li>10. Demonstrate a commitment to environmental stewardship and sustainability, and recognize the role of individual and collective action in promoting a more sustainable and just world.</li> </ol> |
| <b>Indicative Contents</b><br><br>المحتويات الإرشادية                | <ol style="list-style-type: none"> <li>1. Introduction to Environmental Science: Overview of the interdisciplinary nature of environmental science and its importance in understanding and addressing environmental challenges.</li> <li>2. Ecological Systems: The principles of ecology, including the structure and function of ecosystems, the biogeochemical cycles, and the interactions between organisms and their environment.</li> <li>3. Climate Change: The causes, consequences, and mitigation strategies for global climate change, including the role of greenhouse gases, energy systems, and policy solutions.</li> <li>4. Biodiversity and Conservation: The importance of biodiversity, the threats to biodiversity, and conservation strategies, including protected areas, ecosystem restoration, and sustainable use of natural resources.</li> <li>5. Pollution: The sources, impacts, and control of various forms of pollution, including air, water, and soil pollution, and the effects on human health and the environment.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                           | <ol style="list-style-type: none"> <li>6. Environmental Policy and Management: The role of policy and management strategies in addressing environmental issues, including regulatory and market-based approaches, environmental impact assessment, and sustainable development.</li> <li>7. Land Use and Food Systems: The impacts of land use change, urbanization, and agriculture on the environment, including soil degradation, deforestation, and food security challenges.</li> <li>8. Renewable Energy and Energy Efficiency: The principles and technologies of renewable energy sources, including wind, solar, and hydroelectric power, and energy efficiency strategies.</li> <li>9. Environmental Ethics and Justice: The ethical and social dimensions of environmental issues, including environmental justice, sustainability, and the role of individuals and communities in promoting environmental stewardship.</li> <li>10. Interdisciplinary Approaches to Environmental Science: The importance of interdisciplinary approaches to understanding and addressing environmental challenges, including the integration of science, economics, policy, and social science.</li> <li>11. Case Studies in Environmental Science: Examples of real-world environmental challenges, including case studies of local and global environmental issues and the application of environmental science principles and strategies.</li> <li>12. Environmental Science Research Methods: The principles and techniques of environmental science research, including data collection, analysis, and interpretation, and the use of quantitative and qualitative methods.</li> </ol>                                                                                                                                                                                                                                                                                                       |
| <p style="text-align: center;"><b>Learning and Teaching Strategies</b></p> <p style="text-align: center;">استراتيجيات التعلم والتعليم</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Strategies</b>                                                                                                                         | <ol style="list-style-type: none"> <li>1. Lectures: Traditional lectures can be used to provide an overview of key concepts and principles in environmental science, and to introduce students to new topics and ideas.</li> <li>2. Case Studies: Case studies can be used to illustrate real-world environmental issues and challenges, and to encourage critical thinking and problem-solving skills.</li> <li>3. Group Discussions: Group discussions can be used to promote collaboration and critical thinking, and to encourage students to engage with different perspectives and ideas.</li> <li>4. Laboratory Exercises: Laboratory exercises can be used to provide hands-on experience with environmental science concepts and techniques, such as soil analysis, water quality testing, and environmental monitoring.</li> <li>5. Field Trips: Field trips can be used to provide students with first-hand experience of environmental issues and management strategies, and to encourage observation and data collection skills.</li> <li>6. Computer-based Simulations: Computer-based simulations can be used to provide students with a virtual environment where they can explore complex environmental systems and processes.</li> <li>7. Guest Speakers: Inviting guest speakers, such as environmental scientists, policymakers, and community leaders, can be used to provide students with real-world perspectives on environmental issues and solutions.</li> <li>8. Research Projects: Research projects can be used to encourage independent thinking and analysis, and to provide students with an opportunity to apply environmental science concepts and techniques to a specific research question.</li> <li>9. Multimedia Presentations: Multimedia presentations, such as videos, podcasts, and interactive websites, can be used to provide students with alternative ways of accessing and engaging with environmental science concepts and ideas.</li> </ol> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                    |
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|  | <p>10. Role-playing Exercises: Role-playing exercises can be used to encourage students to think creatively and collaboratively about different scenarios and perspectives related to environmental issues and policies.</p> <p>These strategies can be used in combination with each other, and adapted to suit the needs and goals of different courses or modules on environmental science.</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>200</b> |                                                                           |  |

### Module Evaluation

تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

|               | Material Covered                                                                                                                                                                                                                                                                         |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b> | <p>Introduction to Environmental Science</p> <ul style="list-style-type: none"> <li>- Overview of course objectives and expectations</li> <li>- Introduction to key concepts in environmental science, including ecological systems, sustainability, and environmental ethics</li> </ul> |
| <b>Week 2</b> | <p>Principles of Ecology</p> <ul style="list-style-type: none"> <li>- Introduction to ecological principles, including the structure and function of ecosystems, biotic and abiotic factors, and energy flow</li> </ul>                                                                  |

|                |                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <ul style="list-style-type: none"> <li>- Ecological interactions, including competition, predation, and symbiosis</li> </ul>                                                                                                                                                                                                                                                               |
| <b>Week 3</b>  | <p>Climate Change</p> <ul style="list-style-type: none"> <li>- Introduction to climate change and its causes, such as greenhouse gas emissions and deforestation</li> <li>- Impacts of climate change on the environment and human societies, including sea level rise, extreme weather events, and food security</li> </ul>                                                               |
| <b>Week 4</b>  | <p>Biodiversity and Conservation</p> <ul style="list-style-type: none"> <li>- Introduction to biodiversity and its importance</li> <li>- Threats to biodiversity, including habitat destruction and climate change</li> <li>- Strategies for conservation, including protected areas, ecosystem restoration, and sustainable use of natural resources</li> </ul>                           |
| <b>Week 5</b>  | <p>Pollution</p> <ul style="list-style-type: none"> <li>- Introduction to different types of pollution, including air, water, and soil pollution</li> <li>- Impacts of pollution on human health and the environment</li> <li>- Pollution control strategies, including regulation, technology, and behavioral change</li> </ul>                                                           |
| <b>Week 6</b>  | <p>Environmental Policy and Management</p> <ul style="list-style-type: none"> <li>- Overview of environmental policy and its evolution over time</li> <li>- Analysis of different policy approaches, including regulatory and market-based mechanisms</li> <li>- Strategies for environmental management, including environmental impact assessment and sustainable development</li> </ul> |
| <b>Week 7</b>  | <p>Land Use and Food Systems</p> <ul style="list-style-type: none"> <li>- Impacts of land use change, urbanization, and agriculture on the environment, including soil degradation, deforestation, and food security challenges</li> <li>- Sustainable land use and food system strategies, including agroforestry, urban agriculture, and sustainable agriculture practices</li> </ul>    |
| <b>Week 8</b>  | <p>Renewable Energy and Energy Efficiency</p> <ul style="list-style-type: none"> <li>- Introduction to renewable energy sources, including solar, wind, and hydroelectric power</li> <li>- Energy efficiency strategies, including building design and transportation choices</li> </ul>                                                                                                   |
| <b>Week 9</b>  | <p>Environmental Ethics and Justice</p> <ul style="list-style-type: none"> <li>- Overview of environmental ethics and its importance in environmental science</li> <li>- Analysis of environmental justice issues, including disproportionate impacts of environmental hazards on marginalized populations</li> <li>- Strategies for promoting environmental equity and justice</li> </ul> |
| <b>Week 10</b> | <p>Interdisciplinary Approaches to Environmental Science</p> <ul style="list-style-type: none"> <li>- Importance of interdisciplinary approaches to understanding and addressing environmental challenges</li> <li>- Integration of science, economics, policy, and social science in environmental science research and</li> </ul>                                                        |

|                |                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | analysis                                                                                                                                                                                                                                                                                                                                                           |
| <b>Week 11</b> | <p>Case Studies in Environmental Science</p> <ul style="list-style-type: none"> <li>- Examination of real-world environmental challenges, including case studies of local and global environmental issues and the application of environmental science principles and strategies</li> <li>- Analysis of environmental solutions and their effectiveness</li> </ul> |
| <b>Week 12</b> | <p>Case Studies in Environmental Science</p> <ul style="list-style-type: none"> <li>- Examination of real-world environmental challenges, including case studies of local and global environmental issues and the application of environmental science principles and strategies</li> <li>- Analysis of environmental solutions and their effectiveness</li> </ul> |
| <b>Week 13</b> | <p>Research Projects</p> <ul style="list-style-type: none"> <li>- Development and implementation of research projects related to environmental science</li> <li>- Data collection and analysis using environmental science research methods</li> </ul>                                                                                                             |
| <b>Week 14</b> | <p>Research Projects</p> <ul style="list-style-type: none"> <li>- Development and implementation of research projects related to environmental science</li> <li>- Data collection and analysis using environmental science research methods</li> </ul>                                                                                                             |
| <b>Week 15</b> | <p>Environmental Science Communication</p> <ul style="list-style-type: none"> <li>- Effective communication of environmental science research findings and recommendations to different audiences</li> <li>- Use of scientific and technical language, visual aids, and other communication strategies</li> </ul>                                                  |
| <b>Week 16</b> | <p>: Course Review and Reflection</p> <ul style="list-style-type: none"> <li>- Course reflection and evaluation of learning outcomes</li> <li>- Discussion of future directions for environmental science research and action.</li> </ul>                                                                                                                          |

## Learning and Teaching Resources

مصادر التعلم والتدريس

|  | Text | Available in the Library? |
|--|------|---------------------------|
|--|------|---------------------------|

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Required Texts</b>    | <ol style="list-style-type: none"> <li>1. Environmental Science: A Global Concern by William P. Cunningham and Mary Ann Cunningham - This textbook provides a comprehensive introduction to environmental science, covering topics such as ecology, climate change, biodiversity, pollution, and environmental policy.</li> <li>2. Living in the Environment by G. Tyler Miller Jr. and Scott Spoolman - This textbook covers key topics in environmental science, including ecological principles, environmental health, and sustainability, and includes case studies and critical thinking exercises.</li> <li>3. The Sixth Extinction: An Unnatural History by Elizabeth Kolbert - This book explores the current mass extinction event and its causes, including climate change and human activities, and provides insights into conservation strategies.</li> <li>4. Silent Spring by Rachel Carson - This classic book documents the impacts of pesticide use on the environment and human health, and played a key role in the development of the modern environmental movement.</li> </ol>             | No |
| <b>Recommended Texts</b> | <ol style="list-style-type: none"> <li>1. Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming edited by Paul Hawken - This book presents a comprehensive plan to reverse global warming, based on scientific research and analysis of existing strategies and technologies.</li> <li>2. The Water Will Come: Rising Seas, Sinking Cities, and the Remaking of the Civilized World by Jeff Goodell - This book explores the impacts of sea level rise on human societies and infrastructure, and provides insights into adaptation strategies.</li> <li>3. The Ecology of Commerce by Paul Hawken - This book explores the relationship between business and the environment, and provides insights into sustainable business practices and the role of corporations in promoting environmental sustainability.</li> <li>4. An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It by Al Gore - This book provides an overview of climate change and its impacts, and presents strategies for mitigating and adapting to its effects.</li> </ol> | No |

|          |                                                                                                                                                                                                                                                                                                                              |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Websites | 1. Environmental Protection Agency (EPA) - The EPA is a federal agency responsible for protecting human health and the environment through regulation, policy, and research. The website provides information on a wide range of environmental topics, including air and water quality, climate change, and hazardous waste. |
|          | 2. National Oceanic and Atmospheric Administration (NOAA) - The NOAA is a federal agency that provides scientific research and services related to weather, climate, oceans, and coasts. The website provides information on climate data, marine ecosystems, and weather forecasts.                                         |
|          | 3. World Wildlife Fund (WWF) - The WWF is a nonprofit organization dedicated to conservation and protection of endangered species and their habitats. The website provides information on wildlife conservation, sustainable development, and climate change.                                                                |
|          | 4. Intergovernmental Panel on Climate Change (IPCC) - The IPCC is a United Nations body that provides scientific assessments of climate change and its impacts. The website provides information on climate science, adaptation and mitigation strategies, and policy recommendations.                                       |
|          | 5. The Nature Conservancy (TNC) - The TNC is a nonprofit organization focused on conservation and protection of natural ecosystems. The website provides information on conservation strategies, ecosystem restoration, and sustainable land use.                                                                            |
|          | 6. Union of Concerned Scientists (UCS) - The UCS is a nonprofit organization that advocates for science-based solutions to environmental and social challenges. The website provides information on climate change, clean energy, and sustainable agriculture.                                                               |
|          | 7. NASA Earth Observatory - The NASA Earth Observatory provides scientific information and imagery related to Earth's climate, atmosphere, oceans, and land surface. The website includes data visualizations, time-lapse videos, and satellite imagery.                                                                     |
|          | 8. Environmental Defense Fund (EDF) - The EDF is a nonprofit organization that works to protect human health and the environment through science-based solutions and advocacy. The website provides information on clean energy, sustainable agriculture, and climate policy.                                                |

| Grading Scheme                                                                                                                                                                                                                                                                                                                                                                       |                  |                     |          |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|----------|---------------------------------------|
| مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                                         |                  |                     |          |                                       |
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade            | التقدير             | Marks %  | Definition                            |
| Success Group<br>(50 - 100)                                                                                                                                                                                                                                                                                                                                                          | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)                                                                                                                                                                                                                                                                                                                                                               | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                                                                                                                                                                                                                                                                                                                                                                      |                  |                     |          |                                       |
| <b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |                  |                     |          |                                       |

| Module Information                 |                     |                               |                                                                                                                                                                                                                                                     |  |
|------------------------------------|---------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| معلومات المادة الدراسية            |                     |                               |                                                                                                                                                                                                                                                     |  |
| Module Title                       | Statistics          |                               | Module Delivery                                                                                                                                                                                                                                     |  |
| Module Type                        | RSGIS12007          |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |  |
| Module Code                        | B                   |                               |                                                                                                                                                                                                                                                     |  |
| ECTS Credits                       | 7                   |                               |                                                                                                                                                                                                                                                     |  |
| SWL (hr/sem)                       | 175                 |                               |                                                                                                                                                                                                                                                     |  |
| Module Level                       | UGI                 | Semester of Delivery          | 2                                                                                                                                                                                                                                                   |  |
| Administering Department           | Type Dept. Code     | College                       | Type College Code                                                                                                                                                                                                                                   |  |
| Module Leader                      | هالة قحطان حمدي     | e-mail                        | Ali.abdulkadhim@sc.uobaghdad.edu.iq                                                                                                                                                                                                                 |  |
| Module Leader's Acad. Title        | Lecture             | Module Leader's Qualification | MSC                                                                                                                                                                                                                                                 |  |
| Module Tutor                       | Name (if available) | e-mail                        | E-mail                                                                                                                                                                                                                                              |  |
| Peer Reviewer Name                 | Name                | e-mail                        | E-mail                                                                                                                                                                                                                                              |  |
| Scientific Committee Approval Date | 10/3/2026           | Version Number                | 1.0                                                                                                                                                                                                                                                 |  |

| Relation with other Modules       |      |          |  |
|-----------------------------------|------|----------|--|
| العلاقة مع المواد الدراسية الأخرى |      |          |  |
| Prerequisite module               | None | Semester |  |
| Co-requisites module              | None | Semester |  |

| Module Aims, Learning Outcomes and Indicative Contents   |                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                             |
| Module Objectives<br>أهداف المادة                        | 1. Understand the basics of probability and distribution functions such as binomial, normal, and Poisson distributions.<br>2. Calculate and interpret measures of central tendency (mean, median, mode) and dispersion (range, variance, standard deviation) for data sets. |

|                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| الدراسية                                                             | <ol style="list-style-type: none"> <li>3. Use statistical graphs and charts like histograms, bar charts, box plots, and scatter plots to visualize and analyze data.</li> <li>4. Understand the concepts of populations, samples, and sampling methods including random, stratified, cluster and systematic sampling.</li> <li>5. Perform hypothesis testing using the z-test, t-test, chi-square test, ANOVA and other statistical tests. Interpret p-values and confidence intervals.</li> <li>6. Estimate parameters and test hypotheses using statistical software like Excel, Minitab, R or SAS.</li> <li>7. Distinguish between correlation and causation, and calculate and interpret correlation coefficients for data sets.</li> <li>8. Apply statistical analysis techniques to real world examples from various disciplines like business, health sciences, social sciences, engineering, etc.</li> <li>9. Develop an understanding of statistical concepts and reasoning to think critically about uses and limitations of statistics.</li> <li>10. Improve technical communication skills through writing statistical analyses and interpretations in a clear and organized manner.</li> </ol>                                                                                                                                                                                                                                                                        |
| <b>Module Learning Outcomes</b><br><br>مخرجات التعلم للمادة الدراسية | <ul style="list-style-type: none"> <li>• Students will be able to calculate and interpret measures of central tendency and dispersion for data sets.</li> <li>• Students will understand basic probability concepts and properties of probability distributions.</li> <li>• Students will be able to select and apply appropriate graphical representations for different types of data.</li> <li>• Students will be able to apply appropriate sampling methods based on the research context.</li> <li>• Students will be able to perform hypothesis testing using statistical software and interpret the results, including p-values and confidence intervals.</li> <li>• Students will be able to distinguish between correlation and causation when analyzing relationships between variables.</li> <li>• Students will be able to apply statistical analysis techniques to real world examples and case studies from various disciplines.</li> <li>• Students will think critically about the proper use of statistics and limitations of statistical analysis.</li> <li>• Students will effectively communicate statistical analyses and interpretations in writing for different audiences.</li> <li>• Students will develop quantitative reasoning skills to make evidence-based decisions using statistics.</li> <li>• Students will gain the ability to interpret statistical results reported in research studies and the media with a critical perspective.</li> </ul> |
| <b>Indicative Contents</b><br><br>المحتويات الإرشادية                | <ol style="list-style-type: none"> <li>1. Introduction to statistics and probability <ul style="list-style-type: none"> <li>- Overview of statistics and its applications</li> <li>- Components of a data set</li> <li>- Basic probability rules and concepts</li> <li>- Probability distributions: binomial, normal and Poisson</li> </ul> </li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>2. Descriptive statistics</p> <ul style="list-style-type: none"> <li>- Measures of central tendency: mean, median, mode</li> <li>- Measures of dispersion: range, quartiles, variance, standard deviation</li> <li>- Frequency distributions and histograms</li> <li>- Stem and leaf plots, dot plots, box plots</li> <li>- Measures of skewness and kurtosis</li> </ul> <p>3. Probability distributions</p> <ul style="list-style-type: none"> <li>- The normal distribution and the central limit theorem</li> <li>- The binomial distribution</li> <li>- The Poisson distribution</li> </ul> <p>4. Sampling and sampling distributions</p> <ul style="list-style-type: none"> <li>- Populations and samples</li> <li>- Sampling methods</li> <li>- Sampling distributions</li> <li>- Standard error</li> </ul> <p>5. Inference</p> <ul style="list-style-type: none"> <li>- Point estimation and interval estimation</li> <li>- Hypothesis testing (z-test, t-test, chi-square test, ANOVA)</li> <li>- Type I and type II errors, significance level</li> </ul> <p>6. Correlation and regression</p> <ul style="list-style-type: none"> <li>- Correlation coefficients</li> <li>- Simple linear regression</li> <li>- Predicting with regression models</li> </ul> <p>7. Analysis using statistical software</p> <ul style="list-style-type: none"> <li>- Data input, cleaning and manipulation</li> <li>- Graphs and summary statistics</li> <li>- Hypothesis testing commands</li> <li>- Regression analysis</li> </ul> <p>8. Real world applications</p> <ul style="list-style-type: none"> <li>- Case studies from business, health sciences, social sciences, etc.</li> </ul> <p>9. Effective communication of statistical results</p> |
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|  | <ul style="list-style-type: none"> <li>- Reporting measures of central tendency and dispersion</li> <li>- Graphically presenting data</li> <li>- Interpreting statistical tests and models</li> </ul> |
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## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <b>Strategies</b> | <ul style="list-style-type: none"> <li>• Lectures: Initial introduction to concepts and methods through lectures. This helps provide a foundation of knowledge.</li> <li>• Demonstrations: Use demonstrations and worked examples to illustrate statistical procedures and interpretations. This helps make abstract concepts more concrete.</li> <li>• Hands-on practice: Assign statistical exercises and problems for students to practice the methods taught in lectures. Provide timely feedback. This helps develop skills through active learning.</li> <li>• Group activities: Assign group projects involving real world data analysis and interpretation. This fosters teamwork and collaboration skills.</li> <li>• Use of software: Integrate the use of statistical software tools early on. Students can learn by doing data analysis through software. This improves statistical literacy.</li> <li>• Case studies: Discuss real world applications and case studies from various disciplines. This helps students see the relevance of statistics.</li> <li>• Discussions: Have in-class discussions for students to exchange ideas and interpretations. This deepens understanding through peer learning.</li> <li>• Project work: Assign a final individual or group project for students to conduct an independent statistical analysis. This assesses higher order skills.</li> <li>• Formative assessment: Use quizzes, exercises and other low-stakes assessments to provide ongoing feedback for students. This helps monitor progress and identify gaps.</li> <li>• Summative assessment: Use exams and final projects to assess overall learning at the end. This provides accountability.</li> <li>• Seek feedback: Regularly seek feedback from students about the course to identify areas for improvement. Adjust strategies based on student needs.</li> </ul> |
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## Student Workload (SWL)

### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |            |                                                                           |  |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |            | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |            | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b>                                                       | <b>200</b> |                                                                           |  |

|                                       |                                                                                                                                                                                               |             |                  |            |                           |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------|---------------------------|
| الحمل الدراسي الكلي للطلاب خلال الفصل |                                                                                                                                                                                               |             |                  |            |                           |
| Module Evaluation                     |                                                                                                                                                                                               |             |                  |            |                           |
| تقييم المادة الدراسية                 |                                                                                                                                                                                               |             |                  |            |                           |
|                                       |                                                                                                                                                                                               | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
| Formative assessment                  | Quizzes                                                                                                                                                                                       | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                                       | Assignments                                                                                                                                                                                   | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                                       | Projects / Lab.                                                                                                                                                                               | 1           | 10% (10)         | Continuous | All                       |
|                                       | Report                                                                                                                                                                                        | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| Summative assessment                  | Midterm Exam                                                                                                                                                                                  | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                                       | Final Exam                                                                                                                                                                                    | 3hr         | 50% (50)         | 16         | All                       |
| Total assessment                      |                                                                                                                                                                                               |             | 100% (100 Marks) |            |                           |
| Delivery Plan (Weekly Syllabus)       |                                                                                                                                                                                               |             |                  |            |                           |
| المنهاج الاسبوعي النظري               |                                                                                                                                                                                               |             |                  |            |                           |
|                                       | Material Covered                                                                                                                                                                              |             |                  |            |                           |
| Week 1                                | Introduction to Statistics<br>- Definition and importance of statistics<br>- Types of data and scales of measurement<br>- Data collection methods<br>- Descriptive vs. inferential statistics |             |                  |            |                           |
| Week 2                                | Probability<br>- Basic probability concepts<br>- Conditional probability<br>- Bayes' theorem<br>- Probability distributions                                                                   |             |                  |            |                           |
| Week 3                                | Sampling and Sampling Distributions<br>- Simple random sampling<br>- Sampling distributions<br>- Central Limit Theorem<br>- Standard error                                                    |             |                  |            |                           |
| Week 4                                | Confidence Intervals                                                                                                                                                                          |             |                  |            |                           |

|                |                                                                                                                                                                                                                                                                                  |
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|                | <ul style="list-style-type: none"> <li>- Interpretation and construction of confidence intervals</li> <li>- Margin of error</li> <li>- Sample size determination</li> <li>- Confidence intervals for proportions</li> </ul>                                                      |
| <b>Week 5</b>  | <p>Hypothesis Testing</p> <ul style="list-style-type: none"> <li>- Null and alternative hypotheses</li> <li>- Type I and Type II errors</li> <li>- p-values</li> <li>- One-sample and two-sample hypothesis tests</li> </ul>                                                     |
| <b>Week 6</b>  | <p>: Inference for Means</p> <ul style="list-style-type: none"> <li>- One-sample and two-sample t-tests</li> <li>- Paired t-tests</li> <li>- Confidence intervals for means</li> <li>- Assumptions of inference for means</li> </ul>                                             |
| <b>Week 7</b>  | <p>Inference for Proportions</p> <ul style="list-style-type: none"> <li>- Confidence intervals for proportions</li> <li>- Hypothesis testing for proportions</li> <li>- Sample size determination for proportions</li> <li>- Assumptions of inference for proportions</li> </ul> |
| <b>Week 8</b>  | <p>Analysis of Variance (ANOVA)</p> <ul style="list-style-type: none"> <li>- One-way ANOVA</li> <li>- Two-way ANOVA</li> <li>- Post-hoc testing</li> <li>- Assumptions of ANOVA</li> </ul>                                                                                       |
| <b>Week 9</b>  | <p>Simple Linear Regression</p> <ul style="list-style-type: none"> <li>- Association and correlation</li> <li>- Simple linear regression model</li> <li>- Inference for regression coefficients</li> <li>- Residual analysis and diagnostics</li> </ul>                          |
| <b>Week 10</b> | <p>Multiple Linear Regression</p> <ul style="list-style-type: none"> <li>- Multiple regression model</li> </ul>                                                                                                                                                                  |

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|                | <ul style="list-style-type: none"> <li>- Inference for regression coefficients</li> <li>- Model selection and diagnostics</li> <li>- Assumptions of multiple linear regression</li> </ul>                                                   |
| <b>Week 11</b> | <p>Categorical Data Analysis</p> <ul style="list-style-type: none"> <li>- Chi-square goodness-of-fit test</li> <li>- Contingency tables</li> <li>- Tests of independence</li> <li>- Measures of association</li> </ul>                      |
| <b>Week 12</b> | <p>Nonparametric Methods</p> <ul style="list-style-type: none"> <li>- Wilcoxon rank-sum test</li> <li>- Kruskal-Wallis test</li> <li>- Spearman's rank correlation</li> <li>- Assumptions of nonparametric methods</li> </ul>               |
| <b>Week 13</b> | <p>: Time Series Analysis</p> <ul style="list-style-type: none"> <li>- Time series components</li> <li>- Stationarity and differencing</li> <li>- Autocorrelation and partial autocorrelation</li> <li>- ARIMA models</li> </ul>            |
| <b>Week 14</b> | <p>Bayesian Statistics</p> <ul style="list-style-type: none"> <li>- Bayes' theorem revisited</li> <li>- Prior and posterior distributions</li> <li>- Markov Chain Monte Carlo (MCMC) methods</li> <li>- Bayesian model selection</li> </ul> |
| <b>Week 15</b> | <p>Review and Exam Preparation</p> <ul style="list-style-type: none"> <li>- Review of key concepts and topics</li> <li>- Exam preparation strategies</li> <li>- Practice problems and quizzes</li> </ul>                                    |
| <b>Week 16</b> | <p>Final Exam</p> <ul style="list-style-type: none"> <li>- Comprehensive final exam covering all course material.</li> </ul>                                                                                                                |

| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي العملي |                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                        | <b>Material Covered</b>                                                                                                                                                                                                                                          |
| <b>Week 1</b>                                                          | Introduction to Statistical Computing<br>- Introduction to R software<br>- Basic R commands and functions<br>- Data import and export<br>- Data visualization in R                                                                                               |
| <b>Week 2</b>                                                          | Descriptive Statistics and Data Visualization<br>- Data summaries and measures of central tendency<br>- Measures of dispersion and variability<br>- Data visualization using histograms, box plots, and scatter plots<br>- Data transformation and normalization |
| <b>Week 3</b>                                                          | Probability and Probability Distributions<br>- Basic probability concepts<br>- Probability distributions (discrete and continuous)<br>- Normal distribution and its properties<br>- Properties of mean and variance                                              |
| <b>Week 4</b>                                                          | Sampling and Sampling Distributions<br>- Simple random sampling<br>- Sampling distributions<br>- Central Limit Theorem<br>- Standard error                                                                                                                       |
| <b>Week 5</b>                                                          | Confidence Intervals and Hypothesis Testing<br>- Interpretation and construction of confidence intervals<br>- Margin of error<br>- Sample size determination<br>- Hypothesis testing and p-values                                                                |
| <b>Week 6</b>                                                          | One-Sample and Two-Sample t-tests<br>- One-sample t-test<br>- Two-sample t-test                                                                                                                                                                                  |

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|                | <ul style="list-style-type: none"> <li>- Paired t-test</li> <li>- Assumptions of t-tests</li> </ul>                                                                                                                                                              |
| <b>Week 7</b>  | <p>Analysis of Variance (ANOVA)</p> <ul style="list-style-type: none"> <li>- One-way ANOVA</li> <li>- Two-way ANOVA</li> <li>- Post-hoc testing</li> <li>- Assumptions of ANOVA</li> </ul>                                                                       |
| <b>Week 8</b>  | <p>Simple Linear Regression</p> <ul style="list-style-type: none"> <li>- Association and correlation</li> <li>- Simple linear regression model</li> <li>- Inference for regression coefficients</li> <li>- Residual analysis and diagnostics</li> </ul>          |
| <b>Week 9</b>  | <p>Multiple Linear Regression</p> <ul style="list-style-type: none"> <li>- Multiple regression model</li> <li>- Inference for regression coefficients</li> <li>- Model selection and diagnostics</li> <li>- Assumptions of multiple linear regression</li> </ul> |
| <b>Week 10</b> | <p>Categorical Data Analysis</p> <ul style="list-style-type: none"> <li>- Chi-square goodness-of-fit test</li> <li>- Contingency tables</li> <li>- Tests of independence</li> <li>- Measures of association</li> </ul>                                           |
| <b>Week 11</b> | <p>Nonparametric Methods</p> <ul style="list-style-type: none"> <li>- Wilcoxon rank-sum test</li> <li>- Kruskal-Wallis test</li> <li>- Spearman's rank correlation</li> <li>- Assumptions of nonparametric methods</li> </ul>                                    |
| <b>Week 12</b> | <p>Time Series Analysis</p> <ul style="list-style-type: none"> <li>- Time series components</li> <li>- Stationarity and differencing</li> <li>- Autocorrelation and partial autocorrelation</li> </ul>                                                           |

|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                  |
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|                                                                 | - ARIMA models                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |
| <b>Week 13</b>                                                  | Bayesian Statistics<br>- Bayes' theorem revisited<br>- Prior and posterior distributions<br>- Markov Chain Monte Carlo (MCMC) methods<br>- Bayesian model selection                                                                                                                                                                                                                                                                   |                                  |
| <b>Week 14</b>                                                  | Multivariate Analysis<br>- Principal Component Analysis (PCA)<br>- Factor Analysis (FA)<br>- Cluster Analysis<br>- Discriminant Analysis                                                                                                                                                                                                                                                                                              |                                  |
| <b>Week 15</b>                                                  | Survival Analysis<br>- Survival curves and hazard rates<br>- Kaplan-Meier estimator<br>- Log-rank test<br>- Cox proportional hazards model                                                                                                                                                                                                                                                                                            |                                  |
| <b>Week 16</b>                                                  | Review and Exam Preparation<br>- Review of key concepts and topics<br>- Exam preparation strategies<br>- Practice problems and quizzes                                                                                                                                                                                                                                                                                                |                                  |
| <b>Learning and Teaching Resources</b><br>مصادر التعلم والتدريس |                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                  |
|                                                                 | <b>Text</b>                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Available in the Library?</b> |
| <b>Required Texts</b>                                           | 1. "Statistics: The Art and Science of Learning from Data" by Alan Agresti and Christine Franklin<br>2. "Elementary Statistics" by Mario F. Triola<br>3. "Statistics for Engineers and Scientists" by William Navidi<br>4. "Statistics for Business and Economics" by David Anderson, Dennis Sweeney, and Thomas Williams<br>5. "Introduction to Probability and Statistics" by William Mendenhall, Robert Beaver, and Barbara Beaver | No                               |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |
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| Recommended Texts | <ol style="list-style-type: none"> <li>1. "Learning Statistics with R" by Danielle Navarro - This book provides an introduction to statistical analysis using the R programming language.</li> <li>2. "The Elements of Statistical Learning" by Trevor Hastie, Robert Tibshirani, and Jerome Friedman - This book covers various topics in statistical learning, including regression, classification, and clustering.</li> <li>3. "Applied Linear Statistical Models" by Michael Kutner, Christopher Nachtsheim, and John Neter - This book provides a comprehensive treatment of linear regression and its applications.</li> <li>4. "Doing Bayesian Data Analysis" by John Kruschke - This book provides an introduction to Bayesian data analysis using the R programming language.</li> <li>5. "Experimental Design and Analysis" by Steven R. Brown - This book covers the principles and practice of experimental design and analysis, including factorial designs and response surface methodology.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | No |
| Websites          | <p>Khan Academy - <a href="https://www.khanacademy.org/math/statistics-probability">https://www.khanacademy.org/math/statistics-probability</a></p> <ul style="list-style-type: none"> <li>• Khan Academy has excellent free video lessons covering statistics and probability concepts from the basics to more advanced topics.</li> </ul> <p>Statistics How To - <a href="https://www.statisticshowto.com/">https://www.statisticshowto.com/</a></p> <ul style="list-style-type: none"> <li>• This is a comprehensive statistics resource with lessons, definitions, formulas, calculators and examples to help you learn statistics step by step.</li> </ul> <p>Stat Trek - <a href="http://stattrek.com/">http://stattrek.com/</a></p> <ul style="list-style-type: none"> <li>• Stat Trek has a great collection of statistics tutorials, lessons, dictionaries and references organized by type and difficulty level.</li> </ul> <p>Statistics Solutions - <a href="https://www.statisticssolutions.com/">https://www.statisticssolutions.com/</a></p> <ul style="list-style-type: none"> <li>• Statistics Solutions provides lots of free resources including explanations, tutorials, examples and exercises on various statistical topics.</li> </ul> <p>CoolStats - <a href="https://stattrek.com/coolstats">https://stattrek.com/coolstats</a></p> <ul style="list-style-type: none"> <li>• CoolStats aims to make statistics fun with interesting examples, interactive tools and visualizations.</li> </ul> <p>University of Florida Library Guide - <a href="https://guides.uflib.ufl.edu/statista">https://guides.uflib.ufl.edu/statista</a></p> <ul style="list-style-type: none"> <li>• This is a useful guide to finding statistics resources, tutorials, software and data from the University of Florida Libraries.</li> </ul> <p>Youtube Channels:</p> <ul style="list-style-type: none"> <li>- Khan Academy Statistics</li> <li>- StatQuest with Josh Starmer</li> <li>- Jake VanderPlas (Data Science, Statistics and Python)</li> </ul> <p>Software Websites:</p> <ul style="list-style-type: none"> <li>- Excel (Microsoft) for basic statistics</li> <li>- Minitab</li> <li>- RStudio (Free and open source)</li> <li>- SAS Institute</li> <li>- SPSS (IBM)</li> </ul> |    |

## Grading Scheme

### مخطط الدرجات

| Group                              | Grade                   | التقدير             | Marks %  | Definition                            |
|------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group</b><br>(50 - 100) | <b>A</b> - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                    | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                    | <b>C</b> - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                    | <b>D</b> - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                    | <b>E</b> - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group</b><br>(0 – 49)      | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                    | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                    |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

## Module Information

### معلومات المادة الدراسية

|                             |            |                 |                               |                                                                                                                                                                                                                                                     |   |
|-----------------------------|------------|-----------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Module Title                | Geology    |                 |                               | Module Delivery                                                                                                                                                                                                                                     |   |
| Module Type                 | RSGIS12008 |                 |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |   |
| Module Code                 | B          |                 |                               |                                                                                                                                                                                                                                                     |   |
| ECTS Credits                | 8          |                 |                               |                                                                                                                                                                                                                                                     |   |
| SWL (hr/sem)                | 200        |                 |                               |                                                                                                                                                                                                                                                     |   |
| Module Level                |            | UGI             | Semester of Delivery          |                                                                                                                                                                                                                                                     | 2 |
| Administering Department    |            | Type Dept. Code | College                       | Type College Code                                                                                                                                                                                                                                   |   |
| Module Leader               | هبة فوزي   |                 | e-mail                        |                                                                                                                                                                                                                                                     |   |
| Module Leader's Acad. Title |            |                 | Module Leader's Qualification |                                                                                                                                                                                                                                                     |   |

|                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |        |
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| <b>Module Tutor</b>                                                                                                       | Name (if available)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>e-mail</b>         | E-mail |
| <b>Peer Reviewer Name</b>                                                                                                 | Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>e-mail</b>         | E-mail |
| <b>Scientific Committee Approval Date</b>                                                                                 | 10/3/2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Version Number</b> | 1.0    |
| <b>Relation with other Modules</b><br>العلاقة مع المواد الدراسية الأخرى                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |        |
| <b>Prerequisite module</b>                                                                                                | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Semester</b>       |        |
| <b>Co-requisites module</b>                                                                                               | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Semester</b>       |        |
| <b>Module Aims, Learning Outcomes and Indicative Contents</b><br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |        |
| <b>Module Objectives</b><br>أهداف المادة الدراسية                                                                         | <ul style="list-style-type: none"> <li>Understand the basic concepts of geology including the rock cycle, plate tectonics, seismic activity, and geological time scale</li> <li>Identify and classify common rock and mineral types based on their physical and chemical properties</li> <li>Explain how different geological processes shape the Earth's surface, including weathering, erosion, deposition, folding, faulting and metamorphism</li> <li>Describe the formation and structure of tectonic plates, and how plate movements relate to phenomena like earthquakes, volcanoes and mountain building</li> <li>Understand the progression of life through geological time and how fossils are formed and studied by geologists</li> <li>Apply geological concepts to interpret geologic features and landscapes through field observations and maps reading</li> <li>Develop skills to think scientifically, evaluate geological evidence critically and apply knowledge to real world problems</li> <li>Gain experience using tools and equipment relevant to the geological field, including compasses, clinometers, maps and online databases</li> <li>Understand the role of geology in exploiting natural resources and mitigating natural hazards like landslides, volcanic eruptions and earthquakes</li> <li>Develop an appreciation for the history of the earth and how geology contributes to our understanding of the planet and life on it</li> </ul> |                       |        |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية                                                          | <ul style="list-style-type: none"> <li>Students will identify and classify common rock and mineral types based on their properties</li> <li>Students will categorize different types of rocks based on their origins and relate these to the rock cycle.</li> <li>Students will explain the theory of plate tectonics and relate plate movements to geological activities and structures.</li> <li>Students will analyze geological maps and diagrams to interpret geological formations, structures and processes.</li> <li>Students will identify important periods in geological time and place key events in Earth's history in the correct chronological order.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |        |

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|                                                              | <ul style="list-style-type: none"> <li>• Students will describe the formation of fossils and use fossil evidence to interpret changes in life through geological time.</li> <li>• Students will apply knowledge of geology to explain geological hazards like landslides, earthquakes and volcanic eruptions.</li> <li>• Students will think critically to evaluate geological data and explanations.</li> <li>• Students will communicate geological concepts and ideas effectively in writing and verbally.</li> <li>• Students will demonstrate safe and proper use of geological tools, experimental techniques and field equipment.</li> <li>• Students will develop an awareness of how geology applies to topics like natural resource exploitation and environmental issues.</li> </ul> <p>The key parts of effective learning outcomes are:</p> <ul style="list-style-type: none"> <li>• An action verb describing an observable or measurable student action - identify, explain, analyze, etc.</li> <li>• A clear subject or topic that students will demonstrate knowledge of - rocks, plate tectonics, geological time</li> <li>• A defined condition specifying any limits or constraints - based on their properties, using geological maps, applying knowledge to hazards, etc.</li> <li>• An implied standard of achievement - correctly, accurately, effectively, critically, properly, etc.</li> </ul> |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p> | <ul style="list-style-type: none"> <li>•Introduction to geology and the earth <ul style="list-style-type: none"> <li>- Core and mantle structure</li> <li>- Structure of the earth's outer crust</li> <li>- Plate tectonics and the rock cycle</li> </ul> </li> <li>•Minerals and rocks <ul style="list-style-type: none"> <li>- Physical and chemical properties of minerals</li> <li>- Classifying minerals and rocks</li> <li>- Igneous, sedimentary and metamorphic rocks</li> </ul> </li> <li>•Geological time <ul style="list-style-type: none"> <li>- Geological events through time</li> <li>- Fossils, index fossils and the fossil record</li> <li>- Relative and absolute dating techniques</li> </ul> </li> <li>•Earthquakes and volcanoes <ul style="list-style-type: none"> <li>- Causes and characteristics of earthquakes</li> <li>- Distribution of volcanoes and eruption types</li> <li>- Effects of earthquakes and volcanic eruptions</li> </ul> </li> <li>•Landscapes and surface processes</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                              |

|                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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|                                                                                                                                           | <ul style="list-style-type: none"> <li>- Weathering and erosion</li> <li>- Mass movement and mass wasting</li> <li>- Deposition and sedimentation</li> <li>• Structural geology</li> <li>- Stress and strain within rocks</li> <li>- Folding and faulting of rock strata</li> <li>- Interpreting geological structures and maps</li> <li>• Applied geology</li> <li>- Geological hazards and risk assessment</li> <li>- Natural resources and exploitation</li> <li>- Environmental geology</li> <li>• Field work and mapping (practical component)</li> <li>- Using geological equipment and maps</li> <li>- Observing and interpreting rock exposures</li> <li>- Measuring geological features</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p style="text-align: center;"><b>Learning and Teaching Strategies</b></p> <p style="text-align: center;">استراتيجيات التعلم والتعليم</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Strategies</b>                                                                                                                         | <ul style="list-style-type: none"> <li>• Lectures - To introduce key concepts, theories and processes. Lectures should be interactive with questions, discussions and activities.</li> <li>• Practical classes - Hands-on work with rock and mineral samples, maps, field trips and using tools and equipment. This reinforces concepts through practical experience.</li> <li>• Demonstrations - To show students geological phenomena and processes that they cannot observe directly, using models and multimedia.</li> <li>• Field work - Site visits and field trips to observe real geological features and landscapes, collect data and practice mapping skills.</li> <li>• Discussion - In-class debates and group work to explore geological problems, evaluate evidence and develop critical thinking.</li> <li>• Interactive software - Using programs to simulate geological processes, identify rock and mineral samples, and interpret maps and data.</li> <li>• Problem solving tasks - Working through real world geological scenarios to apply knowledge and develop analytical skills.</li> <li>• Formative assessment - Regular lower-stakes tests, quizzes and assignments with feedback to monitor student progress.</li> <li>• Geological models - Using physical and virtual 3D models to illustrate geological structures and processes in a hands-on way.</li> </ul> |

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|                                                                                | <ul style="list-style-type: none"><li>• Case studies - Exploring real examples of how geology is applied to solve practical problems or answer research questions.</li><li>• Self-directed learning - Encouraging students to conduct their own research into particular topics of interest using online resources.</li><li>• Multimedia - Utilizing videos, animations and images to illustrate geological concepts that are difficult to see directly.</li></ul> |                    |                                                                           |                 |                                  |
| <b>Student Workload (SWL)</b><br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                                                           |                 |                                  |
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |                 |                                  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |                 |                                  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 200                |                                                                           |                 |                                  |
| <b>Module Evaluation</b><br>تقييم المادة الدراسية                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                                                           |                 |                                  |
|                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Time/Number</b> | <b>Weight (Marks)</b>                                                     | <b>Week Due</b> | <b>Relevant Learning Outcome</b> |
| <b>Formative assessment</b>                                                    | <b>Quizzes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2                  | 10% (10)                                                                  | 5 and 10        | LO #1, #2 and #10, #11           |
|                                                                                | <b>Assignments</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2                  | 10% (10)                                                                  | 2 and 12        | LO #3, #4 and #6, #7             |
|                                                                                | <b>Projects / Lab.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1                  | 10% (10)                                                                  | Continuous      | All                              |
|                                                                                | <b>Report</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1                  | 10% (10)                                                                  | 13              | LO #5, #8 and #10                |
| <b>Summative assessment</b>                                                    | <b>Midterm Exam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2hr                | 10% (10)                                                                  | 7               | LO #1 - #7                       |
|                                                                                | <b>Final Exam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3hr                | 50% (50)                                                                  | 16              | All                              |
| <b>Total assessment</b>                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    | 100% (100 Marks)                                                          |                 |                                  |
| <b>Delivery Plan (Weekly Syllabus)</b><br>المنهاج الاسبوعي النظري              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                                                           |                 |                                  |
|                                                                                | <b>Material Covered</b>                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                                                                           |                 |                                  |
| <b>Week 1</b>                                                                  | Introduction to geology - Origins of geology, earth structure, rock cycle                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                                           |                 |                                  |
| <b>Week 2</b>                                                                  | Minerals - Properties, classification, identifying features                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                                                                           |                 |                                  |
| <b>Week 3</b>                                                                  | Igneous rocks - Forming processes, textures, identifying features                                                                                                                                                                                                                                                                                                                                                                                                  |                    |                                                                           |                 |                                  |
| <b>Week 4</b>                                                                  | Sedimentary rocks - Forming processes, structures, identifying features                                                                                                                                                                                                                                                                                                                                                                                            |                    |                                                                           |                 |                                  |

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| <b>Week 5</b>                                                          | Metamorphic rocks - Forming processes, grades, textures        |
| <b>Week 6</b>                                                          | Geological time scale - Geological eras, periods and epochs    |
| <b>Week 7</b>                                                          | Plate tectonics - Theory, plate boundaries, crustal movements  |
| <b>Week 8</b>                                                          | Earthquakes and volcanoes - Mechanisms, monitoring, effects    |
| <b>Week 9</b>                                                          | Weathering and erosion - Weathering processes, landforms       |
| <b>Week 10</b>                                                         | Streams and deposition - Sediment transport, landforms         |
| <b>Week 11</b>                                                         | Fossils - Formation, types, uses                               |
| <b>Week 12</b>                                                         | Structural geology - Stress and strain, folding and faulting   |
| <b>Week 13</b>                                                         | Geological maps - Reading, interpreting and constructing maps  |
| <b>Week 14</b>                                                         | Applied and environmental geology - Natural resources, hazards |
| <b>Week 15</b>                                                         | Revision and review                                            |
| <b>Week 16</b>                                                         | Exams                                                          |
| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي العملي |                                                                |
|                                                                        | <b>Material Covered</b>                                        |
| <b>Week 1</b>                                                          | Lab safety and equipment                                       |
| <b>Week 2</b>                                                          | Minerals - hardness test, streak test, luster                  |
| <b>Week 3</b>                                                          | Igneous rocks - texture, grain size                            |
| <b>Week 4</b>                                                          | Sedimentary rocks - particle size, sorting, rounding           |
| <b>Week 5</b>                                                          | Metamorphic rocks - foliations, lineations                     |
| <b>Week 6</b>                                                          | Fossils - characteristics, types                               |
| <b>Week 7</b>                                                          | Topographic maps - contours, gradients                         |
| <b>Week 8</b>                                                          | Aerial photos - identifying geological features                |
| <b>Week 9</b>                                                          | Geologic map skills - strike and dip, outcrops                 |
| <b>Week 10</b>                                                         | Rock mechanics - tensile/compressive strength                  |
| <b>Week 11</b>                                                         | Soil properties - classification, texture                      |
| <b>Week 12</b>                                                         | Groundwater - permeability, porosity                           |
| <b>Week 13</b>                                                         | Seismic data - interpreting P and S waves                      |
| <b>Week 14</b>                                                         | Geologic hazards - risk assessment                             |
| <b>Week 15</b>                                                         | Applied geology - natural resources                            |

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <b>Week 16</b> | <p>Lab cleanup, post-lab assessments</p> <p>In this lab-focused approach:</p> <ul style="list-style-type: none"> <li>•Weeks 2-5 focus on identifying and classifying rocks and minerals.</li> <li>•Weeks 6-9 build mapping skills through interpreting maps, photos and geologic maps.</li> <li>•Weeks 10-13 cover practical techniques like rock testing, soil analysis, groundwater studies and seismic data interpretation.</li> <li>•Weeks 14 and 15 apply geological knowledge to real world issues of hazards and resources.</li> </ul> <p>Lab activities provide hands-on experience that helps cement theoretical knowledge from lectures.</p> <p>Post-lab assessments and assignments throughout allow students to demonstrate their learning and skill development.</p> <p>Lab cleanup and post-lab assessments in the final week wrap up the course.</p> |
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| <b>Learning and Teaching Resources</b><br><b>مصادر التعلم والتدريس</b> |                                                                                                                                                                                                                                                                                                                                    |                                  |
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|                                                                        | <b>Text</b>                                                                                                                                                                                                                                                                                                                        | <b>Available in the Library?</b> |
| <b>Required Texts</b>                                                  | <ol style="list-style-type: none"> <li>1. "Earth: An Introduction to Physical Geology" by Edward J. Tarbuck, Frederick K. Lutgens, and Dennis Tasa</li> <li>2. "Essentials of Geology" by Stephen Marshak</li> <li>3. "Physical Geology" by Charles C. Plummer, Diane H. Carlson, and Lisa Hammersley</li> </ol>                   | No                               |
| <b>Recommended Texts</b>                                               | <ol style="list-style-type: none"> <li>1. "The Geology Book" by Dr. John D. Morris - This book provides an overview of geology from a biblical perspective.</li> <li>2. "The Map That Changed the World" by Simon Winchester - This book tells the story of William Smith and the creation of the first geological map.</li> </ol> | No                               |

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| Websites | <ul style="list-style-type: none"> <li>•USGS (United States Geological Survey) - <a href="https://www.usgs.gov/">https://www.usgs.gov/</a></li> </ul> <p>This is the official website of the USGS and contains a wealth of information on geology, earth science, natural resources and hazards. It has maps, photos, data and educational resources.</p>                      |
|          | <ul style="list-style-type: none"> <li>•Geology.com - <a href="https://geology.com/">https://geology.com/</a></li> </ul> <p>This site has articles, photos, news and information on various topics in geology written for a general audience. It's a good resource for supplementary material.</p>                                                                             |
|          | <ul style="list-style-type: none"> <li>•National Geographic - <a href="https://www.nationalgeographic.org/subjects/earth-science/">https://www.nationalgeographic.org/subjects/earth-science/</a></li> </ul> <p>National Geographic has many excellent articles, photos and videos on geology, earth science, natural disasters and other related topics.</p>                  |
|          | <ul style="list-style-type: none"> <li>•Khan Academy - <a href="https://www.khanacademy.org/science/earth-sciences">https://www.khanacademy.org/science/earth-sciences</a></li> </ul> <p>Khan Academy has free interactive lessons on topics in geology, earth science and related fields. It's a great resource for students to review concepts and test their knowledge.</p> |
|          | <ul style="list-style-type: none"> <li>•Digital Library of Earth Sciences - <a href="https://digital-earth.nasa.gov/">https://digital-earth.nasa.gov/</a></li> </ul> <p>This NASA resource has thousands of images, videos, maps, data and educational material related to earth sciences. It's a rich source for visual and data resources.</p>                               |
|          | <ul style="list-style-type: none"> <li>•OpenTopography - <a href="https://www.opentopography.org/">https://www.opentopography.org/</a></li> </ul> <p>This website hosts high-resolution topographic data for the US. It has elevation models, aerial imagery and other GIS datasets that can be useful for mapping and terrain analysis.</p>                                   |
|          | <ul style="list-style-type: none"> <li>•Earth Observatory - <a href="https://earthobservatory.nasa.gov/">https://earthobservatory.nasa.gov/</a></li> </ul> <p>The Earth Observatory by NASA features maps, images and articles about earth science and geology. It covers current research and major events.</p>                                                               |
|          | <ul style="list-style-type: none"> <li>•USGS Earthquake Hazards Program - <a href="https://www.usgs.gov/natural-hazards/earthquake-hazards">https://www.usgs.gov/natural-hazards/earthquake-hazards</a></li> </ul> <p>This part of the USGS website focuses on earthquakes, including real time data, maps and information about earthquakes around the world.</p>             |
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### Grading Scheme

مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(50 - 100) | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                             | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                             | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                             | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                             | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 - 49)      | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                             | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |

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| <p><b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.</p> |  |  |  |  |

| Module Information                                       |                                   |                               |                                                                                                                                                                                                                                                     |  |
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| معلومات المادة الدراسية                                  |                                   |                               |                                                                                                                                                                                                                                                     |  |
| Module Title                                             | Computer I                        |                               | Module Delivery                                                                                                                                                                                                                                     |  |
| Module Type                                              | B                                 |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |  |
| Module Code                                              | UOB203                            |                               |                                                                                                                                                                                                                                                     |  |
| ECTS Credits                                             | 3                                 |                               |                                                                                                                                                                                                                                                     |  |
| SWL (hr/sem)                                             | 75                                |                               |                                                                                                                                                                                                                                                     |  |
| Module Level                                             | UGI                               | Semester of Delivery          | 2                                                                                                                                                                                                                                                   |  |
| Administering Department                                 | Remote sensing and GIS department | College                       | college of science                                                                                                                                                                                                                                  |  |
| Module Leader                                            | زينب طالب درويش                   | e-mail                        |                                                                                                                                                                                                                                                     |  |
| Module Leader's Acad. Title                              | مدرس                              | Module Leader's Qualification | Phd                                                                                                                                                                                                                                                 |  |
| Module Tutor                                             | Name (if available)               | e-mail                        | E-mail                                                                                                                                                                                                                                              |  |
| Peer Reviewer Name                                       | Name                              | e-mail                        | E-mail                                                                                                                                                                                                                                              |  |
| Scientific Committee Approval Date                       | 10/3/2026                         | Version Number                | 1.0                                                                                                                                                                                                                                                 |  |
| Relation with other Modules                              |                                   |                               |                                                                                                                                                                                                                                                     |  |
| العلاقة مع المواد الدراسية الأخرى                        |                                   |                               |                                                                                                                                                                                                                                                     |  |
| Prerequisite module                                      | None                              |                               | Semester                                                                                                                                                                                                                                            |  |
| Co-requisites module                                     | None                              |                               | Semester                                                                                                                                                                                                                                            |  |
| Module Aims, Learning Outcomes and Indicative Contents   |                                   |                               |                                                                                                                                                                                                                                                     |  |
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                   |                               |                                                                                                                                                                                                                                                     |  |

|                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| <div>Module Objectives</div> <div>أهداف المادة الدراسية</div>                        | <div><div><input type="checkbox"/> To introduce students to fundamental programming concepts using Python.</div><div><input type="checkbox"/> To develop problem-solving skills and logical thinking through coding exercises.</div><div><input type="checkbox"/> To provide hands-on experience with Python for data manipulation and analysis.</div><div><input type="checkbox"/> To prepare students for advanced topics in computer science and software development.</div></div>                                                                                                      |
| <div>Module Learning Outcomes</div> <div>مخرجات التعلم للمادة الدراسية</div>         | <div><div><input type="checkbox"/> Understand and apply basic programming constructs: variables, data types, and control structures.</div><div><input type="checkbox"/> Develop, test, and debug Python programs.</div><div><input type="checkbox"/> Use Python libraries for data handling and analysis.</div><div><input type="checkbox"/> Write reusable and modular code using functions and modules.</div><div><input type="checkbox"/> Implement data structures such as lists.</div><div><input type="checkbox"/> Apply object-oriented programming concepts in Python.</div></div> |
| <div>Indicative Contents</div> <div>المحتويات الإرشادية</div>                        | <div><div><input type="checkbox"/> Introduction to Python and its environment.</div><div><input type="checkbox"/> Basic syntax and semantics of Python.</div><div><input type="checkbox"/> Control structures: loops and conditionals.</div><div><input type="checkbox"/> Functions: definition, scope, and recursion.</div><div><input type="checkbox"/> Data structures: lists.</div><div><input type="checkbox"/> File handling and exceptions.</div><div><input type="checkbox"/> Introduction to libraries for data analysis (e.g., pandas, numpy).</div></div>                       |
| <div>Learning and Teaching Strategies</div> <div>استراتيجيات التعلم والتعليم</div>   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <div>Strategies</div>                                                                | <div><div><input type="checkbox"/> Lectures to introduce theoretical concepts.</div><div><input type="checkbox"/> Practical lab sessions for hands-on experience.</div><div><input type="checkbox"/> Weekly assignments to reinforce learning.</div><div><input type="checkbox"/> Group projects to encourage collaboration.</div><div><input type="checkbox"/> Continuous assessment through quizzes and tests.</div></div>                                                                                                                                                               |
| <div>Student Workload (SWL)</div> <div>الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا</div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <div>Structured SWL (h/sem)</div> <div>الحمل الدراسي المنتظم للطلاب خلال الفصل</div> | <div>Structured SWL (h/w)</div> <div>الحمل الدراسي المنتظم للطلاب أسبوعيا</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <div>Unstructured SWL (h/sem)</div>                                                  | <div>Unstructured SWL (h/w)</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

|                                                                   |            |                                          |  |
|-------------------------------------------------------------------|------------|------------------------------------------|--|
| الحمل الدراسي غير المنتظم للطلاب خلال الفصل                       |            | الحمل الدراسي غير المنتظم للطلاب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل | <b>200</b> |                                          |  |

## Module Evaluation

### تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

|                | Material Covered                                                                                 |
|----------------|--------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Learning Programming with Python Values and Variables                                            |
| <b>Week 2</b>  | Integer and String Values                                                                        |
| <b>Week 3</b>  | Identifiers User Input String Formatting                                                         |
| <b>Week 4</b>  | Expressions and Arithmetic Expressions - Arithmetic -Examples                                    |
| <b>Week 5</b>  | Conditional Statements Boolean – expressions If/Else – statement Other – Conditional Expressions |
| <b>Week 6</b>  | introduction to loops in python ( <b>Type of Loops</b> )                                         |
| <b>Week 7</b>  | Iteration Loops -                                                                                |
| <b>Week 8</b>  | Introduction -to Using Functions                                                                 |
| <b>Week 9</b>  | Functions and -Modules                                                                           |
| <b>Week 10</b> | Writing Functions -1Function -                                                                   |
| <b>Week 11</b> | Basics Parameter –Passing Custom - Functions vs Standard Functions Refactoring -                 |
| <b>Week 12</b> | Writing Functions – 2 Global - Variables                                                         |
| <b>Week 13</b> | Making – Functions ReusableFunctions as -                                                        |
| <b>Week 14</b> | Data Objects Using Objects - String, File - Objects                                              |

|                |                                               |
|----------------|-----------------------------------------------|
| <b>Week 15</b> | Introduction to Lists Building Lists          |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b> |

## Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

|                | Material Covered                                       |
|----------------|--------------------------------------------------------|
| <b>Week 1</b>  | Introduction to Python environment and basic commands. |
| <b>Week 2</b>  | Working with variables and data types.                 |
| <b>Week 3</b>  | Control structures: loops and conditionals.            |
| <b>Week 4</b>  | Functions: definition and usage.                       |
| <b>Week 5</b>  | Advanced function features and error handling.         |
| <b>Week 6</b>  | Working with lists and list operations.                |
| <b>Week 7</b>  | Dictionaries and sets: creation and manipulation.      |
| <b>Week 8</b>  | File I/O: reading from and writing to files.           |
| <b>Week 9</b>  | Exception handling and debugging techniques.           |
| <b>Week 10</b> | Introduction to Python libraries for data analysis.    |
| <b>Week 11</b> | Advanced data structures and algorithms.               |
| <b>Week 12</b> | Project work and application of concepts.              |
| <b>Week 13</b> | Review and reinforcement of key concepts.              |
| <b>Week 14</b> | Final project presentations.                           |
| <b>Week 15</b> | Revision and exam preparation.                         |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>          |

## Learning and Teaching Resources

مصادر التعلم والتدريس

|                          | Severance, Charles. Python for everybody: Exploring Data using .python 3. Charles Severance, 2016                                        | Available in the Library? |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | Python for Everybody: Exploring Data in Python 3, by Charles Severance                                                                   | No                        |
| <b>Recommended Texts</b> | <input type="checkbox"/> Automate the Boring Stuff with Python, by Al Sweigart<br><input type="checkbox"/> Learning Python, by Mark Lutz | No                        |

|                 |                                                                                                                                                                               |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Websites</b> | <input type="checkbox"/> <a href="#">Python Official Documentation</a><br><input type="checkbox"/> W3Schools Python Tutorial<br><input type="checkbox"/> GeeksforGeeks Python |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Grading Scheme

مخطط الدرجات

| Group                              | Grade                   | التقدير             | Marks %  | Definition                            |
|------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| <b>Success Group</b><br>(50 - 100) | <b>A</b> – Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                    | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                    | <b>C</b> – Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                    | <b>D</b> - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                    | <b>E</b> – Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group</b><br>(0 – 49)      | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                    | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                    |                         |                     |          |                                       |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.