

**Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department**



Academic Program and Course Description Guide

2025

Academic Program Description Form

University Name: University of Baghdad

Faculty/Institute: College of Science

Scientific Department: Department of Remote Sensing and GIS

Academic or Professional Program Name: Semesters

Final Certificate Name: BSc in Remote Sensing and GIS

Academic System: BSc in Remote Sensing and GIS

Description Preparation Date: 1/10/2025

File Completion Date: 1/10/2025

Signature:

Head of Department Name:

Prof. Dr. Faleh Hassan Mahmood

Date: / /

Signature:

Scientific Associate Name:

Prof. Dr. Namir Ibrahim Abbas

Date: / /

The file is checked by: Prof. Dr. Israa Ali Zaidan

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: / /

Raed

Signature:

Approval of the Dean

Prof. Dr. Raed Falih Hassan

Date: / /

1. Program Vision

The program vision is articulated in the university's catalogue and website, emphasizing the commitment to excellence in education and research in the fields of remote sensing and GIS.

2. Program Mission

The program mission, as stated in the university's documentation, outlines the goals of providing quality education, fostering research, and promoting the application of remote sensing and GIS technologies.

3. Program Objectives

The objectives of the program include:

- To equip students with theoretical and practical knowledge in remote sensing and GIS.
- To prepare graduates for careers in various sectors utilizing spatial data and analysis.
- To encourage critical thinking and problem-solving skills in real-world applications.
- To promote lifelong learning and professional development in the field.

4. Program Accreditation

The program is accredited by [insert accreditation agency name], ensuring that it meets national and international educational standards.

5. Other external influences

Is there a sponsor for the program? no

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution	6	30	100%	Core program
Requirements	4	20	67%	Basic requirements
College Requirements	2	10	33%	Optional courses
Department Requirements	3	15	50%	Advanced topics

Summer Training	1	3	10%	Practical experience required
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* This can include notes whether the course is basic or optional.

7. Program Description				
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Fourth/first	RSNR401	Natural Resource	•	
Fourth/first	RSOP403	Selective subject	•	
Fourth/first	RSWF405	Mathematics of waves and fields	•	
Fourth/first	RSEP407	Environmental pollution treatment	•	•
Fourth/first	RSRW409	Remote sensing in water resources	•	
Fourth/first	RSLC411	Land cover planning	•	
Fourth/first	EN413	English 4	•	
Fourth/first	RSP415	Graduation Project	•	
Fourth /second	RSEA402	Environmental application in remote sensing and geographic information systems	•	•
Fourth /second	RSRG404	Remote sensing in geology	•	•
Fourth /second	RSLU406	Land use planning	•	
Fourth /second	RSPL408	Environmental planning	•	
Fourth /second	RSHC410	Hydrochemistry	•	
Fourth /second	RSSF412	Sensors: concepts and applications	•	•
Fourth /second	RSST416	Remote sensing techniques	•	
Fourth /second	RSP415	Graduation Project	•	
8. Expected learning outcomes of the program				

Knowledge	
Learning Outcomes 1	A1- Developing his analytical abilities to reach logical solutions to various issues A2- His ability to evaluate the academic program A3- Creating and organizing statistical tables A4- Recognize the basic characteristics of the nature of the scientific material
Skills	
Learning Outcomes 2	B1 - Ability to listen effectively and contribute constructively to the discussion
Learning Outcomes 3	B2 - Ability to make decisions and take responsibility
Ethics	
Learning Outcomes 4	D1-Developing the student's ability to dialog and discussion.
Learning Outcomes 5	D2 - Develop the student's ability to deal with the Internet.

9. Teaching and Learning Strategies

The teaching and learning strategies and methods employed in the program generally include theoretical lectures, practical applications, interactive learning, problem-based learning, case studies, individual and group projects, and the use of specialized software for remote sensing and Geographic Information Systems (GIS).

10. Evaluation methods

Written and oral tests, quizzes, homework assignments, scientific reports, practical applications, projects, presentations, class participation, and the final exam.

11.Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)	Number of the teaching staff	
	General	Special		Staff	Lecturer

PROFESSOR	physics	Remote sensing			YES	
PROFESSOR	Astronomy	Digital image processing			YES	
PROFESSOR	astronomy	astronomy			YES	
PROFESSOR	physics	Digital image processing			YES	
PROFESSOR	astronomy	astronomy			YES	
PROFESSOR	Physics	Remote sensing			YES	
PROFESSOR	Physics	Remote sensing and image processing			YES	
PROFESSOR	Physics	Physics			YES	
Assistant professor	Physics	Remote sensing			YES	
Assistant professor	astronomy	Image processing			YES	
Assistant professor	astronomy	Image processing			YES	
Lecturer	Physics	Thin film			YES	

lecturer	computer	computer			YES	
lecturer	astronomy	astronomy			YES	
lecturer	astronomy	astronomy			YES	
lecturer	Atmospheric sciences	Atmospheric sciences			YES	
lecturer	computer	computer			YES	
lecturer	computer	computer			YES	
lecturer	Civil engineering	Soil mechanics			YES	
lecturer	mathematics	Pure mathematics			YES	
lecturer	Physics	Thin film and image processing			YES	
lecturer	Physics	Remote sensing and image processing			YES	
Assistant lecturer	Physics	Remote sensing and image processing			YES	
Assistant lecturer	Physics	Remote sensing and image processing			YES	
Assistant lecturer	Physics	Remote sensing and image processing			YES	
Assistant lecturer	Physics	Remote sensing and image processing			YES	
Assistant lecturer	Physics	Remote sensing and			YES	

		image processing				
Assistant lecturer	Physics	Remote sensing and image processing			YES	
Assistant lecturer	mathematics	mathematics			YES	
Assistant lecturer	physics	physics			YES	
Assistant lecturer	geography	Urban and regional planning			YES	
Assistant lecturer	astronomy	astronomy			YES	
Assistant lecturer	computer	computer			YES	
Assistant lecturer	computer	computer			YES	
Assistant lecturer	physics	materials			YES	

Professional Development

Mentoring new faculty members

Mentoring New Faculty Members

The mentoring process for new, visiting, full-time, and part-time faculty members involves:

- **Orientation Sessions:** New faculty are introduced to the department, its culture, and resources.
- **Assigned Mentors:** Each new faculty member is paired with an experienced mentor who provides guidance on teaching practices, research opportunities, and departmental expectations.
- **Regular Check-ins:** Scheduled meetings between mentors and mentees to discuss progress, challenges, and professional development goals.
- **Feedback Mechanisms:** Opportunities for new faculty to receive constructive feedback on their teaching and research from peers and mentors.

Professional development of faculty members

Briefly describe the academic and professional development plan and arrangements for faculty such as teaching and learning strategies, assessment of learning outcomes, professional development, etc.

12. Acceptance Criterion

(The acceptance criteria for enrollment in the college include:

- **Academic Qualifications:** Minimum GPA requirements or equivalent qualifications for prospective students.
- **Entrance Exams:** Performance on standardized entrance exams as determined by the college.
- **Central Admission Policies:** Adherence to university-wide admission regulations and criteria set by the Ministry of Education or relevant authorities.
- **Interview Process:** For certain programs, an interview may be conducted to assess the applicant's suitability.

13. The most important sources of information about the program

Key sources of information about the program include:

- **University Website:** Official details on program structure, courses, and faculty.
- **Program Handbook:** A comprehensive guide outlining curriculum, policies, and resources.
- **Advising Office:** Direct consultations with academic advisors for personalized information.
- **Alumni Networks:** Insights and experiences shared by former students regarding the program and career paths.

14. Program Development Plan

The academic and professional development plan includes:

- **Workshops and Seminars:** Regularly scheduled sessions on effective teaching strategies, assessment methods, and the integration of technology in the classroom.
- **Research Support:** Access to resources for research funding, collaboration opportunities, and publishing guidance.
- **Peer Review Opportunities:** Encouraging faculty to participate in peer evaluations to enhance teaching quality and share best practices.
- **Continuous Learning:** Support for faculty pursuing further education, certifications, or attending conferences to stay updated in their fields.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Fourth/first	RSNR401	Natural Resource	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth/first	RSOP403	Selective subject	O	*	*	*	*	*	*	*	*	*	*	*	*
Fourth/first	RSWF405	Mathematics of waves and fields	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth/first	RSEP407	Environmental pollution treatment	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth/first	RSRW409	Remote sensing in water resources	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth/first	RSLC411	Land cover planning	C	*	*	*	*	*	*	*	*	*	*	*	*

Fourth/first	EN413	English 4	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth/first	RSP415	Graduation Project	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth /second	RSEA402	Environmental application in remote sensing and geographic information systems	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth /second	RSRG404	Remote sensing in geology	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth /second	RSLU406	Land use planning	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth /second	RSPL408	Environmental planning	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth /second	RSHC410	Hydrochemistry	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth /second	RSSF412	Sensors: concepts and applications	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth /second	RSST416	Remote sensing techniques	C	*	*	*	*	*	*	*	*	*	*	*	*
Fourth /second	RSP415	Graduation Project	C	*	*	*	*	*	*	*	*	*	*	*	*

- Please tick the boxes corresponding to the individual program learning outcomes under evaluation.

• Remote Sensing and Image Interpretation" • Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman • Digital Image Processing for Remote Sensing" • Ioannis Kanellopoulos, George G. Wilkinson	Recommended Required Texts (if available)
• Remote Sensing of Environment • International Journal of Remote Sensing • IEEE Transactions on Geoscience and Remote Sensing	Main References for Sources
Hyperspectral Remote Sensing: Principles and Applications" Microwave Remote Sensing: Active and Passive"	Supporting Books and References Recommended
• NASA Earth data: يوفّر بيانات مجانية من الأقمار الصناعية مثل MODIS و Landsat. • USGS Earth Explorer: مصدر للحصول على بيانات وصور من الأقمار الصناعية.	Recommended Required Texts (if available)

(4th stage/first course)

Natural resources

1.course name					
Natural resources					
2.CourseCode :					
RSNR401					
3.Semester / Year:					
First semester 2025-2026					
4.discription Preparation Date:					
1/10/2025					
5. forms of attendance					
Attendance					
6.Number of Credit Hours (Total) / Number of Units (Total)					
30 Hours/2 units					
7.Course administrator's name)mention all, (if more than one name					
:Namezehraa najim Abdul-Ameer					
Email: zehraa.najim@sc.uobaghdad.edu.iq					
8.Course Objectives					
Course Objectives	- Preparing specialized graduates in remote sensing to contribute to the development of the country. - Meeting the needs of state sectors with highly qualified personnel. - Encouraging outstanding individuals to work in the department. - Promoting research programs and participation in scientific conferences and seminars. - Achieving quality and academic accreditation.				
9.Teaching and Learning Strategies					
Strategy	- Managing lectures in a way that emphasizes the importance of time. - Assigning students some group tasks. - Utilizing websites and virtual classrooms.				
10.Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Land is the important valuable for mankind	Land Resources	lectures	General questions and discussions
2	2	Land degradation of deterioration of soil of fertility and	Land degradation and soil erosion	lectures	General questions and discussions

		effects of Land degradation			
3	2	Desertification It is a form of land degradation it is a progressive destruction or degradation of arisen maid lands to destruct	Desertification	lectures	General questions and discussions
4	2	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	Land use and Land cover	lectures	General questions and discussions
5	2	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, Earth s water resource including rivers takes and underground a quivers are under stressing many regions	Soil sciences & Water Resources		
6	2	Duplication of Fries Water	The Habitable plant	lectures	General questions and discussions
7	2	review	review		

8	2	exam	exam	lectures	General questions and discussions
9	2	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	Minerals Resources & Types of Minerals Resources		
10	2	Total discovered and un discovered resources discovered sure yet and economically recoverable	Recourses and Reserves	lectures	General questions and discussions
11	2	Mined fuels are for generations of power , required by agriculture industry transport and other sector of the economy , a forest complex ecosystem which is predominantly composed of three shrubs and is usually a closed canopy	Energy Resources & Forests		
12	2	Forests proved an environment for many species of plants and animals that protects and sustains the diversity of nature	Ecological Role of Forests	lectures	General questions and discussions
13	2	Types , importance and conservation methods , the term Biodiversity was coined and	Biodiversity		

		contraction of biological diversity			
14	2	Types and sources of nonrenewable Energy sources	Renewable and non Renewable energy	lectures	General questions and discussions
15	2	exam	exam		
11.Course Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily ,oral, monthlyor written exams, reports.... etc					
12.Learning and Teaching Resources					
) Required textbookscurricular books(if any ,			Natural resources ,williams 2 nd edition 1989		
Main references (sources)			Natural resources , Richardson ,new york 1994		
Recommended books and references (...scientific journals, reports)			All researches that are published in scientific scopus journals		
Electronic References, Websites			Reputable websites. Virtual library. Library websites of some international universities.		

Elective topic (Cybersecurity)

1. Course Name:	
Cybersecurity	
2. Course Code:	
RSOP403	
3. Semester / Year:	
First Semester / Fourth Stage 2025-2026	
4. Description Preparation Date:	
1/10/2025	
5. Available Attendance Forms:	
Weekly Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 Hours / Theoretical	
7. Course administrator's name (mention all, if more than one name)	
Name: Zainab Talib Darweesh Email: Zainab.t@sc.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	- Introduce students to modern cybersecurity concepts and technologies. - Apply GIS technologies in cybersecurity environments. - Develop students' abilities to analyze cyber threats and vulnerabilities. - Understand information protection and network security principles. - Learn cryptography fundamentals and cybersecurity applications. - Enhance analytical thinking and problem-solving skills in cybersecurity.
9. Teaching and Learning Strategies	

Strategy	• PowerPoint presentations. • Google Classroom and e-learning platforms. • Educational video lectures. • Scientific discussions and brainstorming. • Individual and group reports. • Self-learning and blended learning approaches.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Cybersecurity introduction and overview	INTRODUCTION	Lecture presentation	Oral quiz
2	2	Introduction and definition of cybersecurity	INTRODUCTION	Lecture and discussion	Written exam
3	2	Objectives and domains of cybersecurity	INTRODUCTION	Presentation	Assignment
4	2	GIS mapping and spatial analysis of cyberattacks	CYBER SECURITY IN GIS ENVIRONMENT	Lecture	Report
5	2	Threats, vulnerabilities, and consequences	CYBER SECURITY IN GIS ENVIRONMENT	Discussion	Quiz
6	2	Understanding modern cyber threats and AI in cybersecurity	Emerging Trends in Cybersecurity	Online lecture and videos	Oral and written quiz
7	2	Principles of cybersecurity	CYBERSECURITY PRINCIPLES	Lecture	Written exam
8	2	Components of computing environments	CYBERSECURITY PRINCIPLES	Presentation	Assignment
9	2	Cybersecurity models	CYBERSECURITY PRINCIPLES	Lecture	Quiz
10	2	Information security concepts	INFORMATION SECURITY INTRODUCTION	Lecture	Exam
11	2	Substitution algorithms	CRYPTOGRAPHY	Theoretical explanation	Assignment
12	2	Transposition algorithms	CRYPTOGRAPHY	Lecture	Quiz
13	2	Symmetric key cryptography	CRYPTOGRAPHY	Lecture	Exam
14	2	Cryptography applications	CRYPTOGRAPHY	Discussion	Report
15	2	Future trends in cybersecurity	FUTURE OF CYBERSECURITY	Presentation and discussion	Final Exam

11. Course Evaluation

- Daily quizzes: 5%
- Assignments and reports: 5%
- Activities and participation: 5%
- Midterm examination: 25%
- Final examination: 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Rhodes-Ousley, Mark. <i>Information Security: The Complete Reference</i>. 2. Whitman, Michael E. <i>Roadmap to Information Security for IT and Infosec Managers</i>.
Main references (sources)	Instructor-prepared lecture notes and materials.
Recommended books and references (scientific journals, reports...)	Recent research papers published in Scopus-indexed journals.
Electronic References, Websites	• Cisco Networking Academy • NIST Cybersecurity Framework • ENISA Publications

Treatment environment pollutants

1.Course Name:	
Treatment environment pollutants	
2.Course Code:	
RSEP407	
3.Semester / Year:	
1 st /fourth stage	
4.Description Preparation Date : (2025-2026)	
1/10/2025	
5.Available Attendance Forms:	
attendance	
6.Number of Credit Hours (Total) / Number of Units (Total):	
30/2 units	
7.Course administrator's name (mention all, if more than one name)	
Name: Dr.Sundus A.Abdullah Albakry Email: sundus.abdullah@sc.uobaghdad.edu.iq	
8.Course Objectives	
Course Objectives	• -Knowledge of the foundations of environmental science • Knowing the future foundations of environmental engineering and how to measure the foundations • Knowing the importance of linking environmental science to urban planning and its connection to knowledge of sensitivity • Study the sustainable development and the main Goals
9.Teaching and Learning Strategies	
Strategy	• Ability to apply remote sensing data analysis techniques while taking into account global and local technological constraints. • Analyzing scientific problems, arriving at their solution, and being able to suggest appropriate alternatives • Scientific investigation and evaluation

- Constructive scientific discussions and expressing opinions.

10.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Definition Introduction Basic difintions	Treatment environmental pollutants	Power point, Presentation screen Google classroom	Quizzes and Oral and written exam with monthly exam , Homework
2	2	Soil and water remediation and Remediation technologies scientific contents - Historical View - Definitions of remediation. - In Situ Treatment Technologies. - Ex situ Treatment Technologies.	Treatment environmental pollutants	Power point, Presentation screen Google classroom	Quizzes and Oral and written exam with monthly exam , Homework
3	2	Types of pollution 1-Primary of pollutants SO and Co2 Pollutions	Treatment environmental pollutants	Power point, Presentation screen Google classroom	Quizzes and Oral and written exam with monthly exam , Homework
4	2	Soil and water remediation and remediation technologies	Treatment environmental pollutants	Power point, Presentation screen Google classroom	Quizzes and Oral and written exam with monthly exam , Homework
5	2	Air pollution control devices -Cyclone, setting chamber and fabric filters	Treatment environmental pollutants	Power point, Presentation screen Google classroom	Quizzes and Oral and written exam with monthly exam , Homework
6	2	Physical treatments of pollutants'	Treatment environmental pollutants	Power point, Presentation screen Google classroom	Quizzes and Oral and written exam with monthly exam , Homework
7	2	Biological treatments of pollutants'	Treatment environmental pollutants	Tv (52 inch Google classroom	Quizzes and Oral and written exam with monthly exam , Homework

				youtube	
8	2	Limitations of Biological technology Bioremediation. - Bioventing. Biosorption -pathways of hydrocarbon metabolism.	Treatment environmental pollutants	Power point, Presentation screen Google classroom	Quizzes and Oral and written exam with monthly exam , Homework
9	2	Thermal technology treatments -Advantages and disadvantage	Treatment environmental pollutants	Tv (52 inch Google classroom youtube	Quizzes and Oral and written exam with monthly exam , Homework
10	2	Chemical extraction treatments	Treatment environmental pollutants	Power point, Presentation screen Google classroom	Quizzes and Oral and written exam with monthly exam , Homework
11	2	Technology applicability for biological and thermal	Treatment environmental pollutants	Tv (52 inch Google classroom youtube	Quizzes and Oral and written exam with monthly exam , Homework
12	2	Separation Technology description	Treatment environmental pollutants	Tv (52 inch Google classroom youtube	Quizzes and Oral and written exam with monthly exam , Homework
13	2	Remediation of Wastewater by using biofilms	Treatment environmental pollutants	Tv (52 inch Google classroom youtube	Quizzes and Oral and written exam with monthly exam , Homework
14	2	Remediation of Wastewater by using biofilms Updating Syllabus(2025) -The ecological impacts of urban centers -Uncontrolled Physical Expansion	Treatment environmental pollutants	Tv (52 inch Google classroom youtube	Quizzes and Oral and written exam with monthly exam , Homework
15	2	Types of pollution 1-Primary of pollutants SO and Co2 Pollutions Updating Syllabus (2024) 1- Reflectance properties and physiological metal	Treatment environmental pollutants	Power point, Presentation screen Google classroom	Final exam

		and petroleum contamination 2-Study reflectance curves of pollutants			
11.Course Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc					
12.Learning and Teaching Resources					
Required textbooks (curricular books, if any)			-Thirumurthy A 2004, Principles of Environmental Science and Management. Shroff Publishers. Essentials of Ecology Third Edition by Colin - -2 Michael,		
Main references (sources)			All lectures		
Recommended books and references (scientific journals, reports...)			Ecology with geographic information system 2012		
Electronic References, Websites			ll new bulletins and programs are published through approved websites.		

Remote sensing in water resource

1. Course Name: remote sensing in water resource	
2. Course Code: RSRW409	
3. Semester / Year: 1 st semester2025-2026	
4. Description Preparation Date:1-10-2025	
5. Available Attendance Forms: Attendance /mandatory	
6. Number of Credit Hours (Total) / Number of Units (Total): 60 hours /2 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Israa Jameel Muhsin	
Email: israa.mohsen@sc.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	-Developing the student's scientific and applied skills in the following areas:

	- The student's awareness of the importance of remote sensing in water resource and the importance of using them in addition to the applied fields in which this field is included. - Making the student able to be a researcher in the field of remote sensing and how to harness these techniques and employ them in his field of specialization. - Making the student able to employ remote sensing variables and how to use the results obtained from the laboratory in measurement. - Teaching the student how to benefit from these techniques in practical and functional life.....
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9. Teaching and Learning Strategies

Strategy	• Managing the lecture in a way that indicates the importance of time • Assigning the student some group assignments • Websites and electronic classes • Direct questions and discussions about the lecture content • Linking theoretical concepts with practical ones.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	General Introduction to the Role of Remote Sensing in Water Resources	Remote Sensing in Hydrology and Water Resource Management	lectures	Questions and discussions on the topic
2	2	Explanation of the Water Cycle in Nature	Hydrological Cycle and Remote Sensing	lectures	Questions and discussions on the topic
3	2	Study of the Water Surface	Surface Water Resources	lectures	Questions and discussions on the topic
4	2	Importance and Characteristics of Groundwater	Groundwater Resources and Remote Sensing	lectures	Questions and discussions on the topic
5	2		First exam	lectures	
6	2	Study of Factors Affecting Water Discharge and the Role of Remote Sensing Technologies in Their Study	Remote Sensing-Based Groundwater Recharge Mapping	lectures	Questions and discussions on the topic
7	2	Monitoring Water Purity by Calculating Parameters Based on Satellite Imagery	Water Quality Monitoring with Remote Sensing	lectures	Questions and discussions on the topic
8	2	Importance and Types of Surface Water and the Role of Remote Sensing in Their Study	Watershed management	lectures	Questions and discussions on the topic
9	2	Studying the factors affecting water drainage	Remote Sensing-Based Groundwater	lectures	Questions and

		and the role of remote sensing techniques in studying them	Recharge Mapping		discussions on the topic
10	2	Linear and Atmospheric Properties of Water, with an emphasis on the importance of using mathematical problems to understand these properties.x	Watershed Delineation -Land Use / Land Cover (LULC) Mapping -Linear Characteristics -Areal characteristics (shape, drainage texture)	lectures	Questions and discussions on the topic
11	2		Second exam	lectures	
12	2	Continued explanation of surface water and its flow methods	Update(2025-2026) What is Runoff in a Watershed	lectures	Questions and discussions on the topic
13	2	Explanation of the mathematical equations necessary to calculate flow	Methods of Estimating Runoff -Rational Method -Hydrological Modelling: SCS-CN & Runoff Estimation	lectures	Questions and discussions on the topic
14	2	Explaining the importance of snowmelt in replenishing water resources, as well as the role of satellite imagery in distinguishing between snow and clouds.	Update(2025-2026) Snow Detection Using Spectral Properties	lectures	Questions and discussions on the topic
15	2	Review Course information	Review Course information	lectures	Questions and discussions on the topic

11.Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	No text books
Main references (sources)	-Applications of Remote Sensing/ GIS in Water Resources and Flooding Risk Managements. Edited by Hongjie Xie and Xianwei Wang Printed Edition of the Special Issue Published in Water. -Remote Sensing in Hydrology and Water Resources Management. Edited by Weili Duan, Shreedhar Maskey, Pedro Luiz Borges Chaffe, Pingping Luo, Bin He, Yiping Wu and Jingming Hou Printed Edition of the Special Issue Published in Remote Sensing.

	-Applications of Remote Sensing/ GIS in Water Resources and Flooding Risk Managements. Edited by Hongjie Xie and Xianwei Wang Printed Edition of the Special Issue Published in Water. -Remote Sensing in Hydrology and Water Resources Management. Edited by Weili Duan, Shreedhar Maskey, Pedro Luiz Borges Chaffe, Pingping Luo, Bin He, Yiping Wu and Jingming Hou Printed Edition of the Special Issue Published in Remote Sensing
Recommended books and references (scientific journals, reports...)	All research published in Scopus journals and accredited journals
Electronic References, Websites	• Reliable websites. • Virtual library. • Websites of libraries in some international universities

(4th stage /second course)

Land Use Planning

1.Course Name:	
Land Use Planning	
2.Course Code:	
RSLU406	
3.Semester / Year:	
2 nd Semester/2025-2026	
4.Description Preparation Date:	
10/3/2026	
5.Available Attendance Forms:	
Attendance /mandatory	
6.Number of Credit Hours (Total) / Number of Units (Total):	
60 hours /2 units	
7.Course administrator's name (mention all, if more than one name)	
Name: Ban A. Alrzaq	
Email: Ban.abbas@sc.uobaghdad.edu.iq	
• 8.Course Objectives	
Course Objectives	-Developing the student's scientific and applied skills in the following areas: - The student's awareness of the importance of remote sensing techniques and the importance of using them in addition to the applied fields in which this field is included.

	-Making the student able to be a researcher in the field of remote sensing and how to harness these techniques and employ them in his field of specialization. - Making the student able to employ remote sensing variables and how to use the results obtained from the laboratory in measurement. - Teaching the student how to benefit from these techniques in practical and functional life.				
• 9.Teaching and Learning Strategies					
Strategy	• Managing the lecture in a way that indicates the importance of time • Assigning the student some group assignments • Websites and electronic classes • Direct questions and discussions about the lecture content • Linking theoretical concepts with practical ones.				
• 8.Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learnin g method	Evaluation method
1	2	- Introduction to Land Use Planning .	Definition Why Land Use Planning is Important Main Land Use Categories	lectures	Questions and discussions on the topic
	2	Zoning	Definition Types of Zoning Zoning Regulations Include	lectures	Questions and discussions on the topic
3	2	Land Use Planning Process	Steep of Land use planning	lectures	Questions and discussions on the topic
4	2	Principles of Land Use Planning	Defined Principles of Land Use Planning	lectures	Questions and discussions on the topic
5	2	- Urban Growth and Land Use	Definition of Urban Growth Causes of Urban Growth Effects of Urban Growth	lectures	Questions and discussions on the topic
6	2	GIS in Land Use Planning	Importance of GIS in Land Use Planning GIS Functions in Land Use Planning	lectures	Questions and discussions on the topic

7	2	Applications of GIS in Land Use Planning	All GIS Techniques Used in Land Use Planning	lectures	Questions and discussions on the topic
8	2	Advantages of GIS in Land Use Planning	Examples of GIS Use in Urban Planning	lectures	Questions and discussions on the topic
9	2	Role of Remote Sensing in Land Use Planning	Importance of Remote Sensing in Land Use Planning Advantages Limitations	lectures	Questions and discussions on the topic
10	2	Monthly test	Second test	lectures	Questions and discussions on the topic
11	2	Applications of Remote Sensing in Land Use Planning	1- Land Use / Land Cover (LULC) Mapping Agricultural Planning Environmental Monitoring	lectures	Questions and discussions on the topic
12	2	Techniques Used in Remote Sensing for Planning	Image classification techniques, Change Detection, Spectral Analysis Digital Elevation Models (DEM)	lectures	Questions and discussions on the topic
13	2	Environmental Considerations in Land Use Planning	Environmental Issues	lectures	Questions and discussions on the topic
14	2	Environmental Protection Tools.	Environmental Impact Assessment Steps of EIA	lectures	Questions and discussions on the topic
15	2	Review Course information	review	lectures	Questions and discussions on the topic

10.Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

11.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	- Schowengerdt, Robert A. (2007). <i>Remote sensing: models and methods for image processing</i> (3rd ed.). Academic Press . p. 2. ISBN 978-0-12-369407-2 . Archived from the original on 1 May 2016. Retrieved 15 November 2015.
Recommended books and references (scientific journals, reports...)	All research published in Scopus journals and accredited journals
Electronic References, Websites	• Reliable websites. • Virtual library. • Websites of libraries in some international universities

Remote sensing techniques

1.Course Name:	
remote sensing techniques	
2.Course Code:	
RSST414	
3.Semester / Year:	
2 nd Semester/2025-2026	
4.Description Preparation Date:	
10/3/2026	
5.Available Attendance Forms:	
Attendance /mandatory	
6.Number of Credit Hours (Total) / Number of Units (Total):	
60 hours /2 units	
7.Course administrator's name (mention all, if more than one name)	
Name: Israa Jameel Muhsin	
Email: israa.mohsen@sc.uobaghdad.edu.iq	
• 8.Course Objectives	
Course Objectives	-Developing the student's scientific and applied skills in the following areas: - The student's awareness of the importance of remote sensing techniques and the importance of using them in addition to the applied fields in which this field is included. -Making the student able to be a researcher in the field of remote sensing and how to harness these techniques and employ them in his field of specialization. - Making the student able to employ remote sensing variables and how to use the results obtained from the laboratory in measurement. - Teaching the student how to benefit from these techniques in practical and functional life.
• 9.Teaching and Learning Strategies	

Strategy	• Managing the lecture in a way that indicates the importance of time • Assigning the student some group assignments • Websites and electronic classes • Direct questions and discussions about the lecture content • Linking theoretical concepts with practical ones.
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• 8.Course Structure

Week	Hou rs	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
		-Remote sensing definition. -satellite images - true and false colors.	General introduction about satellite image capture	lectures	Questions and discussions on the topic
		1.Preprocessing in remote 2.. Radiometric Calibration 3. Geometric Correction 4. Atmospheric Correction.	How to use preprocessing methods such as calibration and corrections.	lectures	Questions and discussions on the topic
3	2	-Noise reduction -data fusion -Cloud and Shadow Removal - Mosaicking -resampling -data compression	The types of preprocessing	lectures	Questions and discussions on the topic
4	2	- Steps in Change Detection -Types of Change Detection Techniques. - Pixel-based Change Detection.	Principles of Change Detection	lectures	Questions and discussions on the topic
5	2	-Change Detection in Remote Sensing Using NDVI. -urbanization effect on vegetation. - Change Vector Analysis	Application of change detection with examples	lectures	Questions and discussions on the topic
6	2	Monthly Test	First theory test	lectures	Questions and discussions on the topic
7	2	-Vegetation Monitoring -Land Use and Land Cover (LULC) Monitoring. - Climate and Weather Monitoring. - Hydrological and Water	Monitoring techniques in remote sensing	lectures	Questions and discussions on the topic

		Resources Monitoring.			
8	2	- Urban Monitoring. - Disaster Monitoring. - Forest Monitoring.	Application in monitoring techniques	lectures	Questions and discussions on the topic
9	2	- Agricultural Monitoring. - Coastal and Marine Monitoring. - Air Quality and Pollution Monitoring	Other application in monitoring methods	lectures	Questions and discussions on the topic
10	2	Monthly test	Second test	lectures	Questions and discussions on the topic
11	2	-important and types of classification. Unsupervised classification types. -k-mean algorithm. -ISO data algorithm.	Image classification techniques	lectures	Questions and discussions on the topic
12	2	-Supervised classification -types of supervised classification. -minimum distance classifier. -maximum likelihood classifier.	Image classification techniques	lectures	Questions and discussions on the topic
13	2	Apply supervised method mathematically.	Image classification techniques	lectures	Questions and discussions on the topic
14	2	Practice training using E program.	Image classification techniques	lectures	Questions and discussions on the topic
15	2	Review Course information	review	lectures	Questions and discussions on the topic

10.Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

11.Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	- Schowengerdt, Robert A. (2007). <i>Remote sensing: models and methods for image processing</i> (3rd ed.). Academic Press. p. 2. ISBN 978-0-12-369407-2. Archived from the original on 1 May 2016. Retrieved 15 November 2015.
Recommended books and references (scientific journals, reports...)	All research published in Scopus journals and accredited journals
Electronic References, Websites	• Reliable websites. • Virtual library. • Websites of libraries in some international universities

Environmental planning

1.Course Name:					
Environmental planning					
2.Course Code:					
RSPL408					
3.Semester / Year:					
2 nd Semester					
4.Description Preparation Date:					
10-3-2026					
5.Available Attendance Forms:					
Attendance in the classroom					
6.Number of Credit Hours (Total) / Number of Units (Total)					
60/3 units					
4.Course administrator's name (mention all, if more than one name)					
Name: khalid Hussein abbas					
Email:					
5.Course Objectives					
- Understand the principles and concepts of environmental planning. - Familiarize students with environmental laws, regulations, and policies. - Develop skills in conducting environmental assessments and impact evaluations. - Explore strategies for sustainable development and resource management. - Gain knowledge of land use planning techniques and comprehensive planning processes. - Develop effective stakeholder engagement and communication skills. - Address climate change and integrate resilience planning into environmental planning. - Analyze real-world case studies to understand challenges and best practices. - Consider ethical considerations and decision-making frameworks in environmental planning. - Gain practical project development and implementation skills..					
6.Teaching and Learning Strategies					
Teaching and learning strategies include lectures, discussions, hands-on activities, group work, case studies, multimedia resources, technology integration, formative assessments, personalized learning, reflection, experiential learning, scaffolding, feedback and assessment, active learning, and differentiated instruction. These strategies aim to engage students, promote critical thinking, and enhance understanding and skills acquisition.					
7.Course Structure					
We ek	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	1. Understanding the principles of environmental planning, including the role of science, policy, and stakeholder engagement in the planning process. 2. Analyzing and interpreting environmental data, such as air and water quality, land use patterns, and ecological systems. 3. Applying quantitative and qualitative methods to assess the impacts of human activities on the environment, and to develop	Introduction - Conceptual framework for environmental planning - The concept of	Common learning methods include active learning (engaging students in discussions and practical	Common evaluation methods include tests/exams (written or oral assessments), assignments/projects, presentations/demonstrations,

		strategies for mitigating those impacts. 4. Developing environmental plans and policies that balance environmental, social, and economic goals, and that take into account the needs and perspectives of diverse stakeholders. 5. Communicating effectively with various audiences, including policymakers, community groups, and the public, about environmental issues and solutions. 6. Applying ethical professional standards environmental planning, including principles of sustainability, equity, and social justice.	environmental planning • planning elements Characteristics of a successful plan	activities), cooperative learning (promoting collaboration among students), problem-based learning (solving real-world problems), project-based learning (applying knowledge to practical projects), technology-based learning (utilizing digital resources), and self-directed learning (taking initiative in learning independently).	performance assessments, portfolios (collection of work samples), observations, and self-assessment/reflection. These methods are used to measure student progress and assess understanding, skills, and application of knowledge.
2	2	1. Understanding the history, theory, and practice of planning, including the role of planning in shaping communities and regions over time. 2. Analyzing and interpreting data and information related to land use, transportation, housing, economic development, and other planning topics. 3. Applying quantitative and qualitative methods to assess the impacts of planning decisions and to develop strategies for addressing complex planning problems. 4. Developing plans and policies that reflect the values and needs of various stakeholders, including community members, government officials, and private sector actors..	Planning • Planning concept • Planning Obstacles • Planning principles Planning objectives		
3	2	5. Communicating effectively with diverse audiences, including through written reports, oral presentations, and visual media. 6. Applying ethical and professional standards in planning, including principles of social equity, environmental sustainability, and democratic participation	• Planning types • Planning models Kaufman model for strategic planning		
4	2	1. Understanding the basic concepts and principles of environmental science, including ecosystems, biodiversity, climate change, and pollution. 2. Analyzing and interpreting data and information related to environmental issues, including scientific data, policy documents, and media reports.	• Fundamentals of Environment • Ecology • Ecosystem		

		3. Applying critical thinking and problem-solving skills to address complex environmental challenges, and to develop solutions that balance environmental, social, and economic considerations. 4. Communicating effectively about environmental issues and solutions including through written reports, presentations, and visual media.	• Environmental system • Environmental equilibrium Environmental problems		
5	2		Review and 1st Exam		
6	2	1. Applying quantitative and qualitative methods to assess the environmental impacts of planning decisions, and to develop strategies for mitigating those impacts. 2. Developing environmental plans and policies that balance environmental, social, and economic considerations, and that reflect the needs and perspectives of diverse stakeholders. 5. Communicating effectively with various audiences, including policymakers, community groups, and the public, about the environmental implications of planning decisions. 3. Applying ethical and professional standards in environmental planning including principles of sustainability, equity, and social justice.	• The Role of the Planner in Environmental Planning Zoning		
7	2	1. Collaborating with others, including peers, community members, and experts, to address environmental challenges and to develop innovative solutions. 2. Applying ethical and professional standards in environmental studies including principles of social justice, sustainability, and scientific integrity.	Steps in the Environmental Planning Process		
8	2	1. Understanding the legal and regulatory framework for EIA, including national and international laws, policies, and guidelines. 2. Analyzing and interpreting environmental data and information, such as air and water quality, land use patterns, and ecological systems, to assess the potential environmental impacts of proposed projects or activities. 3. Applying quantitative and qualitative methods to evaluate the potential environmental impacts of proposed projects or activities,	Environmental impact assessment		

		and to develop strategies for mitigating those impacts. 4. Developing EIA reports documentation that meet regulatory requirements and that effectively communicate the potential environmental impacts of proposed projects or activities.			
9	2	5. Communicating effectively with various stakeholders, including project developers, government officials, and the public, about the potential environmental impacts of proposed projects or activities, and the strategies for mitigating those impacts. 6. Applying ethical and professional standards in EIA, including principles of scientific integrity, transparency, and public participation.	Environmental Impact Assessment Form		
10	2	1. Understanding the history, theory, and practice of environmental planning, and the role of planners in shaping environmental policy and decision-making. 2. Analyzing and interpreting environmental data, such as air quality, water quality, land use patterns, ecological systems, and using information to inform planning decisions.	Environmental planning (the capital of Islamic civilization Baghdad as a model)		
11	2	1. Understanding the key concepts and principles of environmental law, including the precautionary principle, polluter pays principle, and sustainable development. 2. Analyzing and interpreting national and international environmental laws, regulations, and policies, and their implications for environmental protection and improvement. 3. Applying legal research and analysis skills to assess the adequacy and effectiveness of existing environmental laws and policies. 4. Developing legal strategies and solutions for addressing environmental challenges, such as climate change, pollution, and biodiversity loss. 5. Communicating effectively with various stakeholders, including policymakers, government officials, and the public, about the legal implications of environmental issues and solutions.	Iraqi Environment Protection and Improvement Law No. (27) of 2009		

		6. Applying ethical and professional standards in environmental management, including principles of social justice, environmental ethics, and legal ethics.			
12	2		Review and 2 nd Exam		
13	2	1. Understanding the principles and requirements of the ISO 14001 standard, including the Plan-Do-Check-Act (PDCA) cycle and the process approach to environmental management. 2. Analyzing and interpreting environmental data and information, such as energy use, greenhouse gas emissions, and waste generation, to identify opportunities for improving environmental performance. 3. Applying the ISO 14001 standard to develop and implement an environmental management system that meets the requirements of the standard and is tailored to the needs and objectives of a specific organization. 4. Developing and implementing environmental policies, procedures, and controls that are designed to reduce environmental impacts and improve environmental performance. 5. Conducting internal audits and management reviews to assess the effectiveness of an organization's environmental management system and to identify opportunities for improvement. 6. Applying ethical and professional standards in environmental management, including principles of transparency, accountability, and continuous improvement.	ISO 14000 environmental management group International standard for environmental management system ISO 14001 ISO (International Organization for Standardization)		
14	2	1. Understanding the principles and requirements of the ISO 14001 standard, including the Plan-Do-Check-Act (PDCA) cycle and the process approach to environmental management. 2. Analyzing and interpreting environmental data and information, such as energy use, greenhouse gas emissions, and waste generation, to identify opportunities for improving environmental performance. 3. Applying the ISO 14001 standard to develop and implement an environmental management system that meets the requirements of the standard and is	Environmental Management ISO 14001		

		tailored to the needs and objectives of a specific organization. 4. Developing and implementing environmental policies, procedures, and controls that are designed to reduce environmental impacts and improve environmental performance. 5. Conducting internal audits and management reviews to assess the effectiveness of an organization's environmental management system and to identify opportunities for improvement. 6. Applying ethical and professional standards in environmental management, including principles of transparency, accountability, and continuous improvement.			
15	2	1. Effective Communication: Students will be able to present their ideas clearly and concisely to their peers, using appropriate language and visual aids to enhance understanding. 2. Team Collaboration: Students will demonstrate the ability to work effectively within a group, contributing to discussions, valuing diverse perspectives, and supporting each other's learning throughout the session. 3. Critical Feedback: Students will develop the skills to provide constructive feedback to their peers, focusing on strengths and areas for improvement, and articulating their thoughts respectfully and supportively. 4. Application of Knowledge: Students will apply concepts learned in the course to assess and critique their peers' presentations, demonstrating an understanding of environmental planning principles and methodologies. 5. Problem Solving: Students will engage in collective problem-solving by discussing challenges and proposing potential solutions during the evaluation sessions, fostering an environment of collaborative learning.	Group Assessment: Design a group evaluation session where students can present their ideas and provide feedback to each other, promoting teamwork.		

		6. Reflection and Self-Assessment: Students will reflect on their own contributions and learning experiences in the group assessment, identifying personal strengths and areas for further development in teamwork and presentation skills..			
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8.Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student as in the following:-

daily preparation :- 5 %

daily oral :- 5%

monthly exams :- 10%

reports : 5%

Laboratory : 15 %

Final Exam : 60

9.Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Tom Daniels, "THE ENVIRONMENTAL PLANNING HANDBOOK FOR SUSTAINABLE COMMUNITIES AND REGIONS", 2nd Ed., Copyright © 2014 Taylor & Francis - JUDITH PETTS , "Handbook of Environmental Impact Assessment", University of Birmingham, 1999
Main references (sources)	ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN
Recommended books and reference (scientific journals, reports...)	Books: "Environmental Land Use Planning and Management" by John Randolph and Gilbert M. Masters "Environmental Planning Handbook" by Tom Daniels and Katherine Daniels "Environmental Impact Assessment: Theory and Practice" by Peter Morris and Riki Therivel "Sustainable Urban Development Reader" edited by Stephen M. Wheeler and Timothy Beatley "Principles and Practice of Urban Planning" by Alan M. Berger and Joel Kotkin "Introduction to Environmental Impact Assessment: A Guide to Principles and Practice" by John Glasson, Riki Therivel, and Andrew Chadwick "Sustainable Communities: Planning for the 21st Century" by Woodrow W. Clark II "Environmental Planning: Policies, Perception, and Practice" by Ian Thomas and Mike J. Morley "Land Use Planning and the Environment: A Casebook" by Robert R. Wright and Gary N. Young "Planning Sustainable Cities and Regions: Towards More Equitable Development" by Karen Chapple Scientific Journals and Reports: - Environmental Impact Assessment Review - Journal of Environmental Planning and Management

	• Environmental Planning and Management • Sustainable Cities and Society • Journal of Environmental Management • Environmental Science & Policy • Environmental Planning B: Planning and Design • Global Environmental Change • Environmental Research Letters • United Nations Environment Programme (UNEP) reports and publications
Electronic References, Websites	• 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: https://www.unep.org/ • 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: https://www.wri.org/ • 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: https://www.epa.gov/ • 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: https://www.iaia.org/ • Global Environment Facility (GEF): GEF funds various environmental projects worldwide. Their website offers publications, reports, and resources on sustainable development and environmental planning. Website: https://www.thegef.org/ • 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: https://iclei.org/ • 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: https://www.eea.europa.eu/ • 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: https://www.nrel.gov/ • The Nature Conservancy: The Nature Conservancy website provides resources and case studies on conservation planning, ecosystem management, and sustainable land use practices. Website: https://www.nature.org/ • 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.

Hydrochemistry

1. Course Name:					
Hydrochemistry					
2. Course Code:					
RSHC410					
3. Semester / Year:					
2 nd / 2025- 2026					
4. Description Preparation Date:					
10/3/2026					
5. Available Attendance Forms:					
attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
30hours/2					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Iman Ahmed Mohamed Ali Email: iman.ali@sc.uobaghdad.edu.iq					
8. Course Objectives					
Course Objectives	Preparing graduates specialized in remote sensing to contribute to the development of the country Meeting the needs of the state sectors with highly qualified cadres Encouraging distinguished people to work in the department ☐ Encouraging research programs referred to in scientific conferences and seminars Achieving quality and academic accreditation.				
9. Teaching and Learning Strategies					
Strategy	Managing the lecture in a way that indicates the importance of time Assigning the student some group duties Websites and electronic classes				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Creating a generation capable of dealing wisely with water resources as the primary source of life and identifying the most important factors affecting water pollution.	GIS Application in water management	General questions and discussions	Oral exam and seminar

2	2	Identify the most important modern methods for identifying land uses and the distribution of pollutants therein and determining their source and fate in both soil and water through the application of geographic information systems techniques and software.	Types of plots commonly used to visualize water hydrochemistry	General questions and discussions	Oral exam and
3	2	Study of the molecular structure of water as it exists in nature as an aqueous solution, but a study Chemicals and chemical formula and the resulting form of bonding geometry of the electron orbitals involved in bonding n.	.Water molecule geometry	General questions and discussions	seminar
4	2	Understanding the links between water quality and health in development highlights potential new health crises: from the effects of infectious diseases caused by known pollutants. .Focus on water that is treated for portability, industrial/domestic use, or restoration (environmental/ecosystem, generally for the health of human/aquatic life).	.Water molecule geometry	General questions and discussions	Oral exam and
5	2	Study of Inorganic Components of Water and Their Impact on Its Quality and Uses	Types of concentration units	General questions and discussions	seminar

6	2	review	review	General questions and discussions	Oral exam and
7	2	exam	exam	General questions and discussions	seminar
8	2	Water quality plays a crucial role in human health and ecosystem balance. Poor water quality can lead to various health issues, particularly infectious diseases caused by known pollutants. This section highlights the potential health crises associated with waterborne pathogens and emphasizes the importance of treating water for transportation, industrial/domestic use, and environmental restoration.	Water Quality and Uses	General questions and discussions	Oral exam and
9	2	Understanding the relationship between water quality and health is crucial for addressing emerging health crises. Effective water treatment and management strategies are essential for ensuring safe water for human consumption, industrial use, and environmental sustainability. By focusing on these aspects, we can mitigate the risks associated with waterborne diseases and pollutants, ultimately protecting human health and ecosystems	Problems related to Water Sampling	General questions and discussions	Oral exam and

10	2	Study of Inorganic Components of Water and Their Impact on Quality and Uses	Chemical Component of water	General questions and discussions	seminar
11	2	inorganic components in water affect its quality and suitability for human consumption, industrial, and agricultural use. Ensuring safety requires adopting precise analytical standards (such as ion chromatography) and following health and environmental guidelines.	Chemical Analysis	General questions and discussions	Oral exam and
12	2	Removing these pollutants through technologies like reverse osmosis is crucial for protecting public health and ecosystems.	Problems related to Water Sampling	General questions and discussions	seminar
13	2	exam	exam	General questions and discussions	Oral exam and
14	2	report	report	General questions and discussions	seminar
15	2	review	review	General questions and discussion	Oral exam and

11.Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports.... etc

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Todd, D.K., 1980 Hem J.D., 1971
Main references (sources)	Groundwater hydrology, 2 nd addition, John Wiley, NewYourk, pp. 535 Hem, J.D., 1985 Study and interpretation of chemical analysis of natural water, 3 rd addition, U.S.G.S. Water supply, paper pp. 2254, 263
Recommended books and references (scientific journals, reports...)	Google , Library Genesis , Scientific American ,Research Gate, Scholar articles and journals

Remote sensing in Geology

1. Course Name:	
Remote sensing in geology	
2. Course Code:	
RSEA402	
3. Semester / Year:	
2 nd semester/ 4 th stage 2025-2026	
4. Description Preparation Date:	
10/3/2026	
5. Available Attendance Forms:	
Weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
(60) Hours / (3) units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Muna Hussein Ahmed Email: muna.h@sc.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	• Providing students with exposure to and knowledge of concepts and applications leading to modeling Earth resource management using remote sensing • Acquiring advanced skills in technologies such as hyperspectral, thermal, and LiDAR • Surveying for mapping and modeling
9. Teaching and Learning Strategies	
Strategy	• Assigning students applied research projects using ArcGIS • Dividing students into small working groups to analyze geospatial data and discuss the results • Encouraging students to ask practical questions and explore answers through research and analysis • Analyzing real-world cases such as desertification

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction to remote sensing	Definition of remote sensing characteristics and features of the studied target Energy Interaction with the Earth's Surface	Present the lecture using the whiteboard or using a data projector or television screen As well as an educational channel on YouTube to upload videos to Or view the lectures through the Google Classroom platform.	Written and oral examinations and homework
2	2	GIS Applications Digital Elevation Analysis Model (DEM)	Application of a weighted spatial probability model in GIS to analyses landslides	=	=
3	2	Weight calculations and results verification for landslide maps	Landslide susceptibility mapping A weight calculation and verification	=	=
4	2	Geology	General Geology and Geophysics Hydrology Agricultural Geology	=	=
5	2	Practical applications of remote sensing concepts in Earth sciences	Use of GIS and Remote Sensing to evaluate the Desertification	=	=
6	2	Practical Applications Processes Required for Studying Desertification-Sensitive Area Maps	Mapping Environmentally Sensitive Areas to Desertification	=	=
7	2	The Importance of Remote Sensing in Natural Resource Management	Natural Resource Management	=	=
8	2	exam	exam	=	=
9	2	Application of spatial statistical estimation techniques	Creating a surface with geostatistical techniques	=	=

10	2	Problems of calculating the signal resulting from folding	Using analytical tools when generating surfaces	=	=
11	2	Geological structures	Study of folds, faults, and joints	=	=
12	2	Challenges associated with spatial model applications	Modeling spatial problems	=	=
13	2	Crisis and disaster management using GIS	Geographic Information Systems (GIS) Applications in Disaster Management	=	=
14	2	review	review	=	=
15	2	exam	exam	=	=

11.Course Evaluation

Grades are distributed out of 100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Remote Sensing Intelligent Interpretation for Geology Weitao Chen, Xianju Li, Xuwen Qin, Lizhe Wang
Recommended books and references (scientific journals, reports...)	All research published on Scopus and accredited journals
Electronic References, Websites	All new bulletins and programs are published through approved websites.

Sensors and concepts

1. coursename
Sensors and concepts
2.Coursecode :
RSSF412
3.Semester /year:
2 nd semester 2025-2026
4. Description Preparation Date:
10/3/2026
5.Forms of attendance

Attendance					
6.Number of Credit Hours (Total) / Number of Units (Total)					
30 hours/3 units					
7.Course administrator's name)mention all, (if more than one name					
hasan jaber alatta zehraa najim abdul-ameer Email: zehraa.najim@sc.uobaghdad.edu.iq					
8.Course Objectives					
Course Objectives	Preparing specialized graduates in remote sensing to contribute to the development of the country. Meeting the needs of state sectors with highly qualified personnel. Encouraging outstanding individuals to work in the department. Promoting research programs and participation in scientific conferences and seminars. Achieving quality and academic accreditation.				
9.Teaching and Learning Strategies					
Strategy	Managing lectures in a way that emphasizes the importance of time. Assigning students some group tasks. Utilizing websites and virtual classrooms.				
10.Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Measures temperature changes.	Thermal Sensor (Temperature Sensor):	lectures	General questions and discussions
2	2	Detects smoke or fire. Used in fire alarm	Smoke Sensor	lectures	General questions and discussions
3	2	Distance Sensor: Measures the distance between the sensor and an object. Used in robotics, automotive parking systems, and drones.	Distance Sensor:	lectures	General questions and discussions
4	2	Detects movement in its field of view.	Motion Sensor:	lectures	General questions and discussions
5	2	Measures the water content in soil.	Soil Moisture Sensor:	lectures	General questions and discussions

		Used in agriculture and irrigation systems.			
6	2	Measures the level of moisture in the air. Used in weather monitoring and HVAC systems	Humidity Sensor:	lectures	General questions and discussions
7	2	review	review	lectures	General questions and discussions
8	2	exam	exam	lectures	General questions and discussions
9	2	Used in security systems, automatic doors, and lighting control.	Smoke sensor		
10	2	Measures the water content in soil. Used in agriculture and irrigation systems.	Soil Moisture Sensor:	lectures	General questions and discussions
11	2	Uses sound waves to measure distance or detect objects.	Ultrasonic Sensor:	lectures	General questions and discussions
12	2	Detects motion or heat using infrared radiation.	infrared Sensor:	lectures	General questions and discussions
13	2	Detects the presence of specific gases (e.g., CO ₂ , methane).	Gas Sensor:		
14	2	review	review	lectures	General questions and discussions
15	2	exam	final exam		

11.Course Evaluation

this courseuse exam and experimental laboratory to evaluate students

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	SENSORS ,williams 2 nd edition 2004
Main references (sources)	Sensors, Davidson, new york 2015
Recommended books and references (scientific journals, reports...)	All researches that are published in scientific scopus journals
Electronic References, Websites	Reputable websites. Virtual library. Library websites of some international universities.



**Ministry of Higher Education and
Scientific Research - Iraq
University of Baghdad
College of Science
Department of GIS**



المرحلة الثالثة (الفصل الاول)

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Geophysics		Module Delivery
Module Type	core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	UOBR51		
ECTS Credits	6		
SWL (hr/sem)	150		
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

Module Objectives أهداف المادة الدراسية	- Understand the fundamental principles of geophysics, including the physical properties of Earth materials and the methods used to measure them. - 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. - 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. - Understand the limitations and uncertainties associated with geophysical data and their interpretation, and learn how to critically evaluate geophysical results. - Develop skills in data acquisition, processing, and analysis, including the use of specialized software and equipment. - Learn how geophysics can be applied to a wide range of fields, including mineral exploration, environmental studies, geohazard assessment, and petroleum exploration. - Understand the ethical and professional responsibilities associated with geophysics, including issues related to safety, data quality, and environmental impact. - 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. - Gain an appreciation for the interdisciplinary nature of geophysics and its connections to other fields, such as geology, physics, mathematics, and engineering.
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	- 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	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. 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. 3. 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. 4. 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. 5. Students will be able to apply geophysics to a wide range of fields, including mineral exploration, environmental studies, geohazard assessment, and petroleum exploration. 6. 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. 7. 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. 8. Students will be able to appreciate the interdisciplinary nature of geophysics and its connections to other fields, such as geology, physics, mathematics, and engineering. 9. 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.
Indicative Contents المحتويات الإرشادية	1. Introduction to geophysics: Earth's structure and physical properties, history of geophysics, and the role of geophysics in understanding the Earth. 2. Seismology: seismic waves, wave propagation, seismic data acquisition and processing, seismic imaging, and interpretation techniques. 3. Gravity and magnetics: principles of gravity and magnetic surveys, data acquisition and processing, interpretation techniques, and applications in mineral exploration and geohazard assessment. 4. 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. 5. Geophysical borehole logging: principles of borehole geophysics, data acquisition and processing, interpretation techniques, and applications in petroleum exploration and environmental studies. 6. Geophysical data integration: combining geophysical data with geological, petrophysical, and other information to generate a comprehensive subsurface model. 7. Geophysical inverse theory: mathematical methods used to invert geophysical data and generate subsurface models. 8. Geophysical modeling: numerical models of geophysical processes and their use in interpretation and exploration.

10. Geophysical case studies: examples of geophysical studies in mineral exploration, petroleum exploration, environmental studies, and geohazard assessment.
11. Professional and ethical considerations: safety, data quality, environmental impact, and ethical considerations in geophysical studies.
12. Future directions in geophysics: emerging technologies and techniques, and the future of geophysics as a discipline.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

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.
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.
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.
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.
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.
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.
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.
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.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)		Structured SWL (h/w)	
الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	
Total SWL (h/sem) 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 الأسبوعي النظري

	Material Covered
Week 1	Introduction to geophysics - Definition, history, and scope of geophysics - Physical properties of rocks and minerals
Week 2	Seismic methods - Seismic waves and their propagation - Seismic reflection, refraction, and tomography
Week 3	Gravity and magnetic methods - Gravity anomaly, Bouguer anomaly, and isostasy - Magnetic anomaly, magnetic susceptibility, and magnetic mapping
Week 4	Electromagnetic methods - Electrical resistivity, induced polarization, and magnetotellurics

	- Applications of electromagnetic methods
Week 5	Geophysical data acquisition - Field instrumentation, data recording, and quality control - Geophysical field survey planning
Week 6	Geophysical data processing - Filtering, deconvolution, and velocity analysis - Data visualization and interpretation
Week 7	Geophysical data interpretation - Data modeling, inversion, and integration with geological data - Applications of geophysical interpretation to natural resource exploration, engineering, and environmental site characterization
Week 8	Mid Term Exam.
Week 9	Seismic imaging - 2D and 3D seismic imaging - Seismic attribute analysis
Week 10	Gravity and magnetic interpretation - Forward modeling and inversion - Applications to mineral exploration and natural resource mapping
Week 11	Electromagnetic interpretation - Forward modeling and inversion - Applications to groundwater exploration and environmental site characterization
Week 12	Geophysical case studies - Real-world examples of geophysical surveys and their interpretation in different geological settings - Industry partnerships and case studies
Week 13	Ethics and social responsibility in geophysics - Environmental impact assessment, community engagement, and responsible data management - Emerging issues and trends in geophysics
Week 14	Geophysical project work - Students will design and execute a geophysical survey, process and interpret the data, and present their findings in a report or presentation
Week 15	Course review and exam preparation

	- Review of key concepts and theories covered in the course - Exam preparation and study tips
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Introduction to geophysical data processing software • Introduction to data processing software such as SeisImager/SU, Oasis Montaj, and EMIGMA • Basic data input/output, and visualization
Week 2	Seismic data processing - Seismic data filtering, deconvolution, and velocity analysis - Seismic data imaging and interpretation
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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library ?
Required Texts	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. 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. 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. 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. 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.	No
Recommended Texts	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. 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. 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. 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. 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.	No

Websites	- MIT OpenCourseWare - Geophysics: https://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-340-geophysics-spring-2004/ MIT offers free access to course materials for their geophysics course including video lectures, lecture notes, problem sets, exams, and readings. - Stanford Exploration Project - Geophysics 101: https://sepwww.stanford.edu/public/docs/sep101/ SEP offers free educational materials for geophysics including a digital course book, video lectures, exercises, and more. Covering various topics in geophysics. - OpenGeophysics.org: http://opengeophysics.org/CourseMaterials OpenGeophysics provides freely available lectures, reading materials, and tutorials Coursera Courses in Geophysics: https://www.coursera.org/courses?query=geophysics - 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. - Kansas Geological Survey - Basic Geophysics: http://www.kgs.ku.edu/Extension/geophysics/basic.html They offer free PDF materials covering basic concepts in geophysics and geophysical method
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Grading Scheme				
مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (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 (0 – 49)	FX – Fail	راسب (فيد 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	Analysis and interpretation of spatial images			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOBR52				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		3	Semester of Delivery		
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

Module Objectives أهداف المادة الدراسية	Here are some learning objectives for a course on Analysis and interpretation of spatial images : 1. Interpretation of Satellite Imageries Interpretation is the process of extraction of qualitative and quantitative information of objects from satellite images. 2. To derive useful spatial information from images is the task of image interpretation. 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. 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. 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.
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	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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing a course on Analysis and interpretation of spatial images , students should be able to: 1. Be able to locate sources of technical information about satellites and applications 2. Perform a range of key digital image analyses using specialist software. 3. Interpret the information provided by digital imagery for a range of applications and prepare reports that incorporate outputs from digital image analysis software. 4. Understand remote sensing workflow including image acquisition, (pixel-based) image analysis, classification and validation. 5. Get to know online portals, data catalogues, and pricing schemes for satellite data. 6. Familiarize with the European Copernicus Earth observation programmer. 7. Master standard image analysis routines as implemented in ArcGIS Pro. 8. Explain image analysis techniques to inform the interpretation and enhancement of remote sensing datasets. 9. Apply analysis techniques on remote sensing datasets to solve environmental and social problems that require spatial solutions 10. Operate remote sensing software to produce enhanced spatial information from basic datasets
Indicative Contents المحتويات الإرشادية	Here are some indicative contents that may be covered in a course on Analysis and interpretation of spatial images : 1. Image interpretations 2. image segmentation 3. Image Classification analysis 4. Supervised Classification 5. The Classification Stage 6. The Training Stage 7. Unsupervised Classification 8. Pseudo color composites 9. Principal Component Analysis 10. Change detection 11. Anomaly detection
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.
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Student Workload (SWL) الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي الغير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي الغير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي 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 analysis and interpretation of spatial images. Basis concepts, preliminary notions, practical applications.
Week 2	Principles of image interpretation. Applications of Image Analysis Limitations and future of Image Analysis Technique.
Week 3	Color spaces: properties; perceptual color spaces; linear and non-linear transformations of the RGB color space.
Week 4	Color image preprocessing: color image enhancement; color image denoising; processing in the RGB color space; processing in other color spaces
Week 5	Image Classification. Supervised Classification. The Classification Stage. The Training Stage.
Week 6	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;
Week 7	Landsat, MODIS & other Multi-spectral Sensors; Intro to Image Classification
Week 8	Classification of Mixed Pixels. The Output Stage and Post classification Smoothing.
Week 9	Object-Based Classification. Neural Network Classification. Classification Accuracy Assessment .
Week 10	Algorithm used to obtain Thresholding
Week 11	Change Detection.
Week 12	Image Time Series Analysis . Hyperspectral Image Analysis
Week 13	Mathematical Morphology
Week 14	Image Compression
Week 15	Course review, final project presentations, and exam preparation.

Week 16	Preparatory week before the final Exam
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبرات

	Material Covered
Week 1	Introduction of Image Analysis and Applications
Week 2	Image Segmentation for spital images
Week 3	Edge detection for spital images
Week 4	Edge detection using filtering for spital images
Week 5	Satellites; Landsat, MODIS & other Multi-spectral Sensors; Intro to Image Classification.
Week 6	Image classification for spital images
Week 7	Feature extraction and classification in spital image analysis, supervised Classification
Week 8	Feature extraction and classification in spital image analysis, unsupervised Classification
Week 9	Algorithm used to obtain Thresholding for spital images
Week 10	Change Detection for spital images
Week 11	Color image preprocessing for spital images
Week 12	Color image segmentation for spital images
Week 13	Mathematical Morphology
Week 14	Image Compression
Week 15	Course review, final project presentations, and exam preparation.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر

التعلم والتدريس

	Text	Ava ilab le
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		in the Library?
Required Texts	Here are some required texts for a course on analysis and interpretation of spatial images : 1. Digital Image Processing, Second Edition by Rafael C. Gonzalez and Richard E. Woods, Pearson Education 2. Digital Image Processing by Bhattacharya Chandra and Dwijesh Majumder, PHI 2. 3. Fundamentals of Digital Image Processing by Anil K Jain, PHI 4. Digital Image Processing Using Matlab, Rafael C. Gonzalez and Richard E. Woods, Pearson Education. 5. Lillesand, T.M., Kiefer, R.W. and Chapman, J.W., "Remote Sensing and Image Interpretation", (5th Ed.), John Wiley & Sons, 2007. 6. Drury, S. A., "Image Interpretation in Geology", 2nd Ed, Allen & Unwin, 1993.	No
Recommended Texts	Here are some recommended texts for a course on analysis and interpretation of spatial images : 1. Al Bovik (ed.), "Handbook of Image and Video Processing", Academic Press, 2000. 2. A.K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall, Addison-Wesley, 1989. 3. M. Petrou, P. Bosdogianni, "Image Processing, The Fundamentals", Wiley, 1999. 4. P. Ramesh Babu, Digital Image Processing. Scitech Publications., 2003. 5. Bernd Jähne, Digital Image Processing, Springer-Verlag Berlin Heidelberg 2005. 6. B. Jähne, "Practical Handbook on Image Processing for Scientific Applications", CRC Press, 1997. 7. J. C. Russ. The Image Processing Handbook. CRC, Boca Raton, FL, 4th edn., 2002. 8. J. S. Lim, "Two-dimensional Signal and Image Processing" Prentice-Hall, 1990. 9. Rudra Pratap, Getting Started With MATLAB 7. Oxford University Press, 2006 10. W. K. Pratt. Digital image processing, PIKS Inside. Wiley, New York, 3rd, edn., 2001. 11. Stephane Marchand-Maillet, Yazid M. Sharaiha, Binary Digital Image Processing, A Discrete Approach, Academic Press, 2000.	No
Websites	1. (https://www.esri.com/training/catalog/5c9a65e0190cf23eac628f9c/performing-supervised-object-based-image-classification/) 2. (https://www.esri.com/training/catalog/5c75869c65e21d6e2187b712/performing-supervised-pixel-based-image-classification/) 3. (https://www.esri.com/training/catalog/5cf6d9a5e8c1820501654ee3/detecting-objects-with-deep-learning/) 4. (https://www.esri.com/training/catalog/5c9a727b190cf23eac62a78f/performing-accuracy-assessment-for-image-classification/)	

Grading Scheme

مخطط الدرجات

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

Success Group (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 (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	GIS in Public Health		Module Delivery	
Module Type	Elective		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOBR53			
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	لؤي 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

By the end of this module, students will be able to:

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.

Module Objectives

أهداف المادة الدراسية

1. Understand the fundamental concepts of Geographic Information Systems (GIS) and their applications in public health
 2. Explain the role of spatial analysis in disease surveillance, health planning, and epidemiological studies
 3. Collect, manage, and analyze spatial health data using GIS software and geospatial technologies
 4. Apply GIS techniques to identify disease patterns, environmental health risks, and healthcare accessibility
 5. Produce thematic maps and spatial models to support public health decision-making
 6. Evaluate the relationships between environmental, social, and demographic factors and health outcomes
 7. Use GIS tools for outbreak investigation, emergency response, and health resource allocation
 8. Integrate remote sensing and spatial databases into public health research and community health assessment
 9. Interpret spatial statistics and geographic patterns related to public health indicators
- Develop practical GIS-based solutions for improving public health services and sustainable community health management

Module Learning Outcomes

مخرجات التعلم للمادة الدراسية

Upon successful completion of the course, students will be able to:

- Define GIS concepts and spatial data structures.
- Perform spatial data collection and georeferencing.
- Conduct disease mapping and hotspot analysis.
- Analyze healthcare accessibility and service distribution.
- Use GIS software for epidemiological investigations.
- Interpret spatial relationships between environment and health.
- Design maps and reports for public health communication.
- Apply GIS in disaster management and outbreak response.

Indicative Contents

المحتويات الإرشادية

Unit 1: Introduction to GIS and Public Health

- Definition and concepts of GIS
- Components of GIS
- Importance of GIS in public health
- Historical development of health GIS
- 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
- Smart health systems
- Sustainable development and health GIS
- Future directions of spatial health technologies

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

- ☐ Disease Surveillance
- ☐ Epidemic and Pandemic Monitoring
- ☐ Environmental Health Assessment
- ☐ Healthcare Accessibility Studies

- ☐ Vaccination Campaign Planning
- ☐ Emergency and Disaster Response
- ☐ Sustainable Health Development
- ☐ Spatial Decision Support Systems

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) 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 and Public Health
Week 2	Spatial Data Types and Sources
Week 3	3 Coordinate Systems and Map Projections
Week 4	Disease Mapping and Health Visualization
Week 5	7 Epidemiology and Spatial Analysis
Week 6	Mid-Term Examination
Week 7	Environmental Health and Risk Mapping
Week 8	Healthcare Accessibility Analysis

Week 9	Spatial Statistics in Public Health
Week 10	Remote Sensing Applications in Health Studies
Week 11	Spatial Statistics in Public Health
Week 12	GIS in Disaster and Emergency Management
Week 13	Public Health Decision Support Systems
Week 14	Student Presentations and Final Project
Week 15	Siminars
Week 16	

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	
Week 2	
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	

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	☐ Gatrell, A., & Loytonen, M. <i>GIS and Health</i> . ☐ Longley, P. et al. <i>Geographic Information Systems and Science</i> . ☐ Burrough, P. A., & McDonnell, R. <i>Principles of Geographical Info</i>	

Websites	1. ESRI Training Manuals and Public Health GIS Resources.
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Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☒ Practical ☒ Seminar	
Module Code	RSGIS35023				
ECTS Credits	6				
SWL (hr/sem)	150				
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

Module Objectives أهداف المادة الدراسية	- To enhance students' knowledge in GIS data structures and management. - To provide fundamental concepts of remote sensing and GIS databases. - To develop students' skills in handling GIS software and spatial data. - To build analytical and problem-solving abilities in geospatial data processing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A. Knowledge and Understanding - Apply critical thinking and problem-solving in GIS and remote sensing. - Analyze scientific problems using mathematical and scientific principles. - Communicate effectively in both Arabic and English in a scientific context. - Understand international standards in remote sensing and GIS. B. Subject-Specific Skills - Apply techniques for analyzing remote sensing data. - Solve scientific problems and propose alternative solutions. - Conduct scientific investigation and evaluation. - Participate in constructive scientific discussions. C. Thinking Skills - Analyze, interpret, and organize knowledge effectively. - Apply deep and surface learning strategies to solve problems. - Develop hypothesis formulation and scientific reasoning. D. General and Transferable Skills - Communication and IT skills in teamwork environments. - Ability to work collaboratively.

	• Proficiency in Arabic and English communication. • Leadership, quick thinking, and analytical prediction skills.
Indicative Contents المحتويات الإرشادية	☐ Basics of computer files ☐ Geospatial data structures (vector & raster) ☐ Database design and lifecycle ☐ GIS databases ☐ Relational database benefits ☐ Vector data structures and topology ☐ Spatial data quality ☐ Raster data structures (encoding methods) ☐ Graphic data structures in GIS ☐ Database systems and DBMS ☐ Database architecture ☐ Data models
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Theoretical and practical lectures • Discussions and interactive dialogue • Field visits • Seminars and student presentations • Research assignments • Library and self-learning activities Outcomes achieved through: • Differentiating correct vs. incorrect information • Scientific writing and reasoning • Linking concepts and technical instructions • Interpretation and analysis skills
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا	
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا

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Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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	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
Week 9	Queries: Basics and Simple Queries
Week 10	Advanced Queries (Criteria, Calculations, Parameter Queries)
Week 11	Forms: Creating and Designing Forms
Week 12	Advanced Forms and Controls
Week 13	Reports: Creating and Formatting Reports
Week 14	Advanced Reports and Data Presentation
Week 15	Macros in Microsoft Access
Week 16	Database Management, Security, and Optimization

Learning and Teaching Resources

مصادر التعلم والتدريس

		Available in the Library?
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Required Texts	Required Textbook	NO
	<i>Fundamentals of Relational Database Management Systems</i> – S. Sumathi & S. Esakkirajan (2007) Main References - Elmasri & Navathe – <i>Fundamentals of Database Systems</i> - C.J. Date – <i>Introduction to Database Systems</i> - Ramakrishnan & Gehrke – <i>Database Management Systems</i>	
Recommended Texts	Recommended Resources - Scopus-indexed journals and scientific publications - Online GIS and database platforms - Official software documentation	NO
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (0 – 49)	FX – Fail	راسب (فيد 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 الثالثة (الفصل الثاني)

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Information System		Module Delivery
Module Type	C		☒ Theory ☒ Lecture Lab Tutorial Practical ☒ Seminar
Module Code	RSGIS35023		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	3	Semester of Delivery	6
Administering Department	Remote sensing and GIS department		College
			college of science
Module Leader	Zainab T. Al-Ars		e-mail
			E-mail Zainab.t@sc.uobaghdad.edu.iq
Module Leader's Acad. Title	Lecturer	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	10/03/2026	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

Module Objectives أهداف المادة الدراسية	• To introduce students to the fundamental concepts of Information Systems in GIS and Remote Sensing. • To develop students' understanding of system structures, components, and workflows. • To explain the role of Information Systems in spatial analysis and decision-making. • To enhance analytical thinking and problem-solving skills in geospatial environments. • To provide knowledge about system integration, databases, and decision support systems in GIS applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A. Knowledge and Understanding • Understand the concepts and classifications of Information Systems. • Explain the relationship between GIS and Information Systems. • Analyze data flow and information processing in spatial systems. • Understand database and decision-support concepts in GIS applications. B. Subject-Specific Skills • Apply GIS information system concepts in practical applications. • Analyze system structures and workflows in GIS environments. • Evaluate spatial data management processes. • Use analytical reasoning in system design and spatial problem-solving. C. Thinking Skills • Develop logical and analytical thinking abilities. • Interpret spatial workflows and system architectures. • Compare different Information System models and applications. D. General and Transferable Skills • Communication and teamwork skills. • Scientific discussion and presentation skills. • Ability to use IT and GIS technologies effectively. • Self-learning and research skills.
Indicative Contents المحتويات الإرشادية	• Introduction to Information Systems • System Concepts and Characteristics • Input, Process, Output, and Feedback • Data, Information, and Knowledge • Components of Information Systems • Evolution of Information Systems • Types of Information Systems • Transaction Processing Systems (TPS)

	• Management Information Systems (MIS) • Decision Support Systems (DSS) • Executive Support Systems (ESS) • Data Flow and Information Processing in GIS • System Integration in GIS Applications • Information Systems Failures and Decision-Making
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	• Theoretical lectures using PowerPoint presentations. • Interactive classroom discussions. • GIS and Information Systems demonstrations. • Student presentations and seminars. • Research assignments and reports. • E-learning and self-learning activities using online platforms.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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 Information Systems
Week 2	System Concepts and Characteristics
Week 3	Input, Process, Output, and Feedback Model
Week 4	Data, Information, and Knowledge
Week 5	Components of Information Systems
Week 6	Evolution and Importance of Information Systems in GIS and Remote Sensing
Week 7	Types of Information Systems
Week 8	Transaction Processing Systems (TPS)
Week 9	Management Information Systems (MIS)
Week 10	Midterm Exam
Week 11	Decision Support Systems (DSS)
Week 12	Executive Support Systems (ESS)
Week 13	Information Processing and Data Flow in GIS
Week 14	System Integration and GIS Applications
Week 15	Information Systems Failures and Decision-Making
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Available in the Library?
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Required Texts	Required Texts - Fundamentals of Information Systems - Introduction to Information Systems in GIS Main References - Lecture notes prepared by the instructor. - GIS and Remote Sensing scientific references.	NO
Recommended Texts	Recommended References - Scopus-indexed journals in GIS and Information Systems. - Scientific reports and online GIS resources.	NO
Websites	Websites Esri GIS Resources - QGIS Documentation Google Maps Platform	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	Aerial and thermal photography			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOBRS62				
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	
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

Module Objectives أهداف المادة الدراسية	- 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. - 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. - 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
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	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. - 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. - 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. - 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Explain the principles and concepts of aerial and thermal photography, including the types of cameras used, photogrammetry, and thermal imaging. - Describe the different types of equipment and technology used in aerial and thermal photography, including drones, airplanes, satellites, and sensors. - Interpret and analyze images captured through aerial and thermal photography, and identify key features and patterns in the images. - Apply aerial and thermal photography techniques to various fields, including mapping, surveying, environmental monitoring, and object identification and analysis. - Process and analyze images using various software tools and techniques, such as photogrammetry software, GIS software, and programming languages. - 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. - Apply critical thinking and problem-solving skills to real-world scenarios involving aerial and thermal photography techniques and technologies. - Communicate effectively about aerial and thermal photography concepts and techniques, both orally and in writing. - 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.
Indicative Contents المحتويات الإرشادية	- Introduction to aerial and thermal photography: - Definition and basic principles of aerial and thermal photography - Types of cameras and sensors used in aerial and thermal photography - Applications and benefits of aerial and thermal photography technology - Aerial photography platforms and equipment: - Drones and their components - Fixed-wing aircraft and their components - Satellites and their components - Cameras, sensors, and other equipment used in aerial photography - Photogrammetry and georeferencing: - Principles of photogrammetry - Georeferencing techniques and applications

	- Creating accurate and precise maps using aerial photography 4. Thermal imaging: - Basic principles of thermal imaging - Applications of thermal imaging in various fields - Interpreting thermal images and identifying thermal patterns 5. Image interpretation and analysis: - Identifying key features in aerial and thermal images - Interpreting images to gain insights into various fields such as agriculture, environmental studies, and urban planning - Using GIS software to analyze and interpret aerial and thermal images 6. Image processing and analysis: - Processing and analyzing aerial and thermal images using various software tools and techniques - Creating 3D models from aerial images - Programming languages and tools for image processing and analysis 7. Legal and ethical considerations: - Regulations and guidelines related to the use of drones and other aerial platforms - Privacy concerns related to aerial photography - Safety considerations and guidelines for aerial photography 8. Applications of aerial and thermal photography: - Mapping and surveying - Environmental monitoring - Object identification and analysis in various fields such as archaeology, geology, and agriculture - Urban planning and development 9. Future trends and innovations: - Emerging technologies in aerial and thermal photography - Potential applications of aerial and thermal photography in the future - Challenges and opportunities in the field of aerial and thermal photography.
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	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.
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- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) 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
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

Summative assessment	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 Aerial and Thermal Photography - Definition and basic principles of aerial and thermal photography - Types of cameras and sensors used in aerial and thermal photography - Applications and benefits of aerial and thermal photography technology
Week 2	Aerial Photography Platforms and Equipment - Drones and their components - Fixed-wing aircraft and their components - Satellites and their components - Cameras, sensors, and other equipment used in aerial photography
Week 3	Photogrammetry and Georeferencing - Principles of photogrammetry - Georeferencing techniques and applications - Creating accurate and precise maps using aerial photography
Week 4	Thermal Imaging - Basic principles of thermal imaging - Applications of thermal imaging in various fields - Interpreting thermal images and identifying thermal patterns
Week 5	: Image Interpretation and Analysis - Identifying key features in aerial and thermal images - Interpreting images to gain insights into various fields such as agriculture, environmental studies, and urban planning - Using GIS software to analyze and interpret aerial and thermal images
Week 6	Image Processing and Analysis - Processing and analyzing aerial and thermal images using various software tools and techniques - Creating 3D models from aerial images - Programming languages and tools for image processing and analysis
Week 7	Legal and Ethical Considerations

	- Regulations and guidelines related to the use of drones and other aerial platforms - Privacy concerns related to aerial photography - Safety considerations and guidelines for aerial photography
Week 8	Applications of Aerial and Thermal Photography in Agriculture - Monitoring crop health and yield using aerial photography - Using thermal imaging to optimize irrigation and detect water stress in crops - Mapping and surveying farmland using aerial photography
Week 9	Applications of Aerial and Thermal Photography in Environmental Monitoring - Monitoring wildlife populations and habitats using aerial photography - Detecting changes in land use and identifying environmental hazards using aerial photography - Using thermal imaging to detect changes in water temperature and pollution in water bodies
Week 10	Applications of Aerial and Thermal Photography in Urban Planning and Development - Creating 3D models of urban areas using aerial photography - Using thermal imaging to identify areas of heat loss in buildings and improve energy efficiency - Mapping and surveying urban infrastructure using aerial photography
Week 11	Applications of Aerial and Thermal Photography in Archaeology and Geology - Mapping and surveying archaeological sites using aerial photography - Identifying buried structures and features using aerial photography - Using thermal imaging to detect changes in soil temperature and locate underground water sources
Week 12	Applications of Aerial and Thermal Photography in Disaster Response - Assessing damage and identifying areas of need using aerial photography - Locating survivors and detecting areas of heat using thermal imaging - Monitoring disaster zones and environmental impacts using aerial photography
Week 13	Applications of Aerial and Thermal Photography in Wildlife Conservation - Tracking the movement of wildlife and monitoring changes in habitat using aerial photography - Detecting animal activity at night and identifying areas of animal concentration using thermal imaging - Mapping and surveying wildlife populations using aerial photography
Week 14	Future Trends and Innovations in Aerial and Thermal Photography - Emerging technologies in aerial and thermal photography - Potential applications of aerial and thermal photography in the future - Challenges and opportunities in the field of aerial and thermal photography
Week 15	Review and Assessment - Review of course concepts and principles

	- Assessment of student learning through exams, assignments, or projects
Week 16	Preparatory week before the final Exam
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Aerial and Thermal Photography - Introduction to the lab equipment and software - Basic principles of aerial and thermal photography - Hands-on activity: Introduction to drones and flying techniques
Week 2	Aerial Photography Platforms and Equipment - Hands-on activity: Building and flying a drone - Hands-on activity: Operating a fixed-wing aircraft - Hands-on activity: Operating a satellite
Week 3	Photogrammetry and Georeferencing - Hands-on activity: Capturing aerial images for photogrammetry - Hands-on activity: Georeferencing aerial images using GIS software - Hands-on activity: Creating a 3D model from aerial images
Week 4	Thermal Imaging - Introduction to thermal cameras and sensors - Hands-on activity: Capturing thermal images - Hands-on activity: Interpreting thermal images and identifying thermal patterns
Week 5	: Image Interpretation and Analysis - Hands-on activity: Identifying key features in aerial and thermal images - Hands-on activity: Interpreting images to gain insights into various fields such as agriculture, environmental studies, and urban planning - Hands-on activity: Using GIS software to analyze and interpret aerial and thermal images
Week 6	Image Processing and Analysis - Introduction to image processing and analysis software - Hands-on activity: Processing and analyzing aerial and thermal images using various software tools and techniques
Week 7	Legal and Ethical Considerations - Hands-on activity: Understanding regulations and guidelines related to the use of drones and other aerial platforms - Hands-on activity: Identifying privacy concerns related to aerial photography
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	- Hands-on activity: Implementing safety considerations and guidelines for aerial photography
Week 8	Applications of Aerial and Thermal Photography in Agriculture - Hands-on activity: Monitoring crop health and yield using aerial photography - Hands-on activity: Using thermal imaging to optimize irrigation and detect water stress in crops - Hands-on activity: Mapping and surveying farmland using aerial photography
Week 9	Applications of Aerial and Thermal Photography in Environmental Monitoring - Hands-on activity: Monitoring wildlife populations and habitats using aerial photography - Hands-on activity: Detecting changes in land use and identifying environmental hazards using aerial photography - Hands-on activity: Using thermal imaging to detect changes in water temperature and pollution in water bodies
Week 10	: Applications of Aerial and Thermal Photography in Urban Planning and Development - Hands-on activity: Creating 3D models of urban areas using aerial photography - Hands-on activity: Using thermal imaging to identify areas of heat loss in buildings and improve energy efficiency - Hands-on activity: Mapping and surveying urban infrastructure using aerial photography
Week 11	Applications of Aerial and Thermal Photography in Archaeology and Geology - Hands-on activity: Mapping and surveying archaeological sites using aerial photography - Hands-on activity: Identifying buried structures and features using aerial photography - Hands-on activity: Using thermal imaging to detect changes in soil temperature and locate underground water sources
Week 12	Applications of Aerial and Thermal Photography in Disaster Response - Hands-on activity: Assessing damage and identifying areas of need using aerial photography - Hands-on activity: Locating survivors and detecting areas of heat using thermal imaging - Hands-on activity: Monitoring disaster zones and environmental impacts using aerial photography
Week 13	Applications of Aerial and Thermal Photography in Wildlife Conservation - Hands-on activity: Tracking the movement of wildlife and monitoring changes in habitat using aerial photography - Hands-on activity: Detecting animal activity at night and identifying areas of animal concentration using thermal imaging - Hands-on activity: Mapping and surveying wildlife populations using aerial photography
Week 14	: Future Trends and Innovations in Aerial and Thermal Photography - Hands-on activity: Exploring emerging technologies in aerial and thermal photography - Hands-on activity: Identifying potential applications of aerial and thermal photography in the future - Hands-on activity: Overcoming challenges and seizing opportunities in the field of aerial and thermal photography
Week 15	Review and Assessment

	- Review of lab activities and concepts learned - Assessment of student learning through lab reports or projects
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Paul R. Wolf, Bon A. Dewitt, and Benjamin E. Wilkinson, “Elements of Photogrammetry with Applications in GIS” , 4th Ed., Copyright @ 2014 by McGraw-Hill Education • U. Snehalatha , K. Palani Thanaraj and Kurt Ammer, “Artificial Intelligence Based Infrared Thermal Image Processing and Its Applications”, 1st Ed., @ 2023, CRC Press is an imprint of Taylor & Francis Group, LLC	No
Recommended Texts	• James S. Aber, Irene Marzolff, 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. • Shaun Foster and David Halbstein, “Integrating 3D Modeling Photogrammetry and Design”, Copyright @ 2014 , Springer London • 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 • Qihao Weng , “High Spatial Resolution Remote Sensing, Data, Analysis, and Applications” , Copyright @ 2018 by Taylor & Francis Group, LLC. • Wilfried Linder, “Digital Photogrammetry: A Practical Course”, © Springer-Verlag Berlin Heidelberg 2003, 2006, 2009, 2016. • Michael Vollmer and Klaus-Peter Möllmann • Infrared Thermal Imaging • Fundamentals, Research and Applications • Second Edition • © 2018 WILEY-VCH Verlag GmbH & Co. KGaA, • Boschstr. 12, 69469 Weinheim, Germany	No
Websites	Here are some websites that offer references and resources for aerial and thermal photography courses: 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. 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. 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.	

	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. 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. 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.
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Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	Complex	Module Delivery
Module Type	Basic	☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
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

Module Objectives أهداف المادة الدراسية	1- To study the techniques of complex variables and functions together with their derivatives, Contour integration and transformations. 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will be able to: 1. Identify curves and regions in the complex plane defined by simple expressions. 2. Describe basic properties of complex integration and having the ability to compute such integrals. 3. Decide when and where a given function is analytic and be able to find it series development. 4. Describe conformal mappings between various plane regions. 5. Present the central ideas in the solution of Dirichlet's problem. Give the main ideas in the proof of the Riemann mapping theorem.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- The theory and applications of complex functions. 2- Topics covered include analytic functions, 3- Taylor and Laurent series, integrals, Cauchy's theorem, residues, evaluation of certain real integrals. 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 : 1. Lectures: Lectures can provide an overview of key concepts and techniques in digital image processing. 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 complex.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
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Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	138	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	8
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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)

المناهج 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.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

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

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	GIS software packages	Module Delivery	
Module Type	Core	☒ Theory	
Module Code	UOBR564	☒ Lecture	
ECTS Credits	7	☒ Lab	
SWL (hr/sem)	175	☐ Tutorial	
		☐ Practical	
		☐ Seminar	
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 م.م. قصي نعمه 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. 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.

	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. 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.
Indicative Contents المحتويات الإرشادية	The indicative contents of learning GIS software packages typically include the following: 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. 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. 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. 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. 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. 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. 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. 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. 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.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and teaching strategies for GIS software packages typically include the following: 1. Lectures: 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.
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2. **Demonstrations:** 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.
3. **Hands-on exercises:** 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.
4. **Case studies:** 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.
5. **Group projects:** 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.
6. **Online resources:** 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.

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.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) 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 - Lecture: Introduction to GIS concepts and applications - Demonstration: Overview of GIS software packages - Hands-on exercise: Installing and setting up GIS software - Reading: Introduction to GIS, Chapter 1
Week 2	Spatial data creation and management - Lecture: Spatial data types and coordinate systems - Demonstration: Data input and editing - Hands-on exercise: Creating and editing spatial data - Reading: Getting to Know ArcGIS, Chapter 2
Week 3	Spatial analysis techniques - Lecture: Spatial analysis concepts and techniques - Demonstration: Buffering and overlaying - Hands-on exercise: Spatial analysis using GIS software - Reading: GIS Fundamentals, Chapter 5
Week 4	Data visualization - Lecture: Cartographic design and map elements - Demonstration: Creating maps and charts - Hands-on exercise: Designing and presenting a map - Reading: Cartography: Thematic Map Design, Chapter 4
Week 5	Spatial data storage and retrieval - Lecture: Data storage and retrieval concepts - Demonstration: File formats and databases - Hands-on exercise: Storing and retrieving spatial data - Reading: GIS Fundamentals, Chapter 12
Week 6	Working with different data sources - Lecture: Remote sensing and GPS data - Demonstration: Integrating different data sources - Hands-on exercise: Working with satellite imagery and GPS data - Reading: Getting to Know ArcGIS, Chapter 3
Week 7	GIS software packages - Lecture: Features and functionalities of GIS software packages - Demonstration: Comparison of different GIS software packages - Hands-on exercise: Using different GIS software packages - Reading: The GIS 20: Essential Skills, Chapter 1
Week 8	GIS applications - Lecture: GIS applications in different fields - Demonstration: Case studies of GIS applications - Hands-on exercise: Using GIS for a real-world problem

	- Reading: GIS Fundamentals, Chapter 16
Week 9	Spatial statistics - Lecture: Spatial statistics concepts and methods - Demonstration: Descriptive and inferential statistics - Hands-on exercise: Spatial statistics using GIS software - Reading: GIS Fundamentals, Chapter 7
Week 10	Geodatabases - Lecture: Geodatabase design and management - Demonstration: Creating and using geodatabases - Hands-on exercise: Geodatabase design and management - Reading: Getting to Know ArcGIS, Chapter 6
Week 11	Geoprocessing - Lecture: Geoprocessing concepts and tools - Demonstration: Using geoprocessing tools - Hands-on exercise: Geoprocessing using GIS software - Reading: GIS Fundamentals, Chapter 8
Week 12	Web GIS - Lecture: Web GIS concepts and applications - Demonstration: Building a web map - Hands-on exercise: Creating a web map using GIS software - Reading: The GIS 20: Essential Skills, Chapter 18
Week 13	Lidar and 3D analysis - Lecture: Lidar data and 3D analysis - Demonstration: Working with Lidar data - Hands-on exercise: 3D analysis using GIS software - Reading: GIS Fundamentals, Chapter 14
Week 14	Mobile GIS - Lecture: Mobile GIS concepts and applications - Demonstration: Mobile data collection using GIS software - Hands-on exercise: Mobile data collection using GIS software - Reading: Mobile GIS, Chapter 2
Week 15	Spatial modeling - Lecture: Spatial modeling concepts and methods - Demonstration: Building a spatial model - Hands-on exercise: Building a spatial model using GIS software - Reading: GIS Fundamentals, Chapter 9
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to GIS software packages - Overview of GIS software packages in the market - Understanding the differences between open-source and proprietary GIS software - Introduction to QGIS and ArcGIS
Week 2-3	Week 2-3: QGIS - Installation and configuration of QGIS - Basic operations in QGIS (adding data, creating layers, symbolizing data) - Geoprocessing and spatial analysis in QGIS - Map layout and printing in QGIS
Week 4-5	ArcGIS - Installation and configuration of ArcGIS

	- Basic operations in ArcGIS (adding data, creating layers, symbolizing data) - Geoprocessing and spatial analysis in ArcGIS - Map layout and printing in ArcGIS
Week 6-7	Spatial Analysis in QGIS - Spatial analysis using QGIS tools (buffering, intersection, union, etc.) - Advanced spatial analysis in QGIS (interpolation, georeferencing, etc.) - Introduction to plugins in QGIS
Week 8-9	Spatial Analysis in ArcGIS - Spatial analysis using ArcGIS tools (buffering, intersection, union, etc.) - Advanced spatial analysis in ArcGIS (interpolation, georeferencing, etc.) - Introduction to extensions in ArcGIS
Week 10-11	Remote Sensing in QGIS - Introduction to remote sensing concepts - Processing and analyzing remote sensing data in QGIS - Image classification in QGIS
Week 12-13	Remote Sensing in ArcGIS - Processing and analyzing remote sensing data in ArcGIS - Image classification in ArcGIS
Week 14-15	Web GIS - Introduction to web GIS concepts - Creating web maps using QGIS and ArcGIS - Publishing web maps using QGIS and ArcGIS

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	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: 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" by Andy Mitchell provide in-depth coverage of GIS analysis techniques using ArcGIS. 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. 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. 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. 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.	No
Recommended Texts	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: 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	No

	on Geographic Information Systems" by Paul Bolstad is a comprehensive textbook that covers GIS concepts and theory, as well as practical applications using ArcGIS. 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. 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. 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. 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.	
Websites	1. ArcGIS: The official website for ArcGIS is https://www.esri.com/en-us/arcgis/products/arcgis-pro/overview . 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. 2. QGIS: The official website for QGIS is https://www.qgis.org/en/site/ . 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. 3. AutoCAD Map 3D: The official website for AutoCAD Map 3D is https://www.autodesk.com/products/autocad-map-3d/overview . 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 https://www.esri.com/en-us/arcgis/products/cityengine/overview . 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

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	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	Research Methodology			Module Delivery	
Module Type	Supplement			☒ Theory ☐ Lecture ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOB309				
ECTS Credits	1				
SWL (hr/sem)	25				
Module Level		3	Semester of Delivery		6
Administering Department		Type Dept. Code	College	Type College Code	
Module Leader	زهراء نجم عبد الامير		e-mail		
Module Leader's Acad. Title		Professor	Module Leader's Qualification		Ph.D.
Module Tutor	None		e-mail	None	
Peer Reviewer Name			e-mail	auday.h@sc.uobaghdad.edu.iq	
Review Committee Approval		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

Module Aims أهداف المادة الدراسية	- Preparing the student to the basic principles of the scientific method and to be able to locate information necessary to conduct research. - Teaching the student to be capable of critically reviewing research. - Give a knowledge to write a good scientific paper and reports and to present findings to colleagues. Also understand the ethics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- The student will acquire knowledge of the basic principles of the scientific method. - The student will be able to locate information necessary to conduct research, to use computerized databases, and be familiar with psychology web-based resources. - The student will be capable of critically reviewing research reports and to synthesize a body of literature. - The student will be able to develop testable hypotheses. - 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. - 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. - The student will be able to conduct simple statistical analyses of data and to interpret the results of the analyses. - The student will be able to draw conclusions from the research and to assess the generalizability of study results. - The student will be able to write research reports and to present findings to colleagues.
Indicative Contents المحتويات الإرشادية	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
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 (which helps students to reach the following results: 1- The scientific ability to distinguish between correct information and wrong information. 2- Ease of scientific drafting and ease of correction. 3. Ability to memorize and guess. 4- The ability to link concepts and principles with reality. 5. Ability to invoke, link, interpret.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	16	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	9	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	0.6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	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)

المناهج الاسبوعي النظري مادة منهجية البحث

	Material Covered	<u>Research Methodology</u>
Week 1	1. Research Methodology: (a) A review of the Fundamentals (b) Definitions of Research (c) Objectives of Research	
Week 2	(a) Motivation in Research (b) General Characteristics of Research (c) Types of Research	
Week 3	2. The Research Problem (a) What is a Research Problem (b) Selecting the Problem	
Week 4	(a) Sources of the Problem (b) Statement of a Problem (c) Evaluation of a Problem	
Week 5	3. The Review of Literature (a) Meaning of Review of Literature (b) Objectives of Review of Literature	
Week 6	(a) Sources of Literature (b) Reporting the Review of Literature	
Week 7	4. The Research Approach (a) The Qualitative Approach (b) The Quantitative Approach	
Week 8	(a) The Mixed-Methods Approach (b) Criteria for Selecting a Research Approach	
Week 9	5. Data Collection Methods (a) Questionnaires (b) Interviews	
Week 10	(a) Focus Groups (b) Observation	
Week 11	1. Sampling (a) Meaning and Definition of Sampling	
Week 12	(a) Functions of Population and Sampling (b) Methods of Sampling	
Week 13	1. Preparation of the Research (a) Characteristics of a Good Research Title	
Week 14	(b) Structure of research paper: (1) Abstract (2) Introductions (3) Review of the literature (4) Methodology (5) Result & Discussions (6) Conclusions (7) References	
Week 15	Preparatory Week	

Week 16	Final Exam
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Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Research Methodology by Ashish Kumar Sharma (2020)	Yes
Recommended Texts	Scientific Research Methodology by Alejandro Drewes (2021)	Yes
Websites		

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (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 (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

Module Title	Sustainable Energy	Module Delivery	
Module Type	C	☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	RSGIS23009		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	UGII		Semester of Delivery
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Sundus abd alabass Albakry	e-mail	sundus.abdullah@sc.uobaghdad.edu.iq
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.
Module Tutor		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 أهداف المادة الدراسية	Here are some potential learning objectives related to sustainable energy: 1. Define sustainable energy and explain its importance in mitigating climate change and promoting environmental sustainability. 2. Identify different sources of sustainable energy, such as solar, wind, hydropower, geothermal, and bioenergy, and describe their advantages and disadvantages. 3. Analyze the economic, social, and environmental impacts of transitioning to sustainable energy systems, including job creation, energy independence, and reduced greenhouse gas emissions. 4. Evaluate the technological and policy barriers to scaling up sustainable energy systems and propose strategies for overcoming these barriers. 5. Apply principles of energy efficiency to reduce energy consumption and optimize the use of sustainable energy sources.
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	- 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. - 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. - Understand the social and cultural dimensions of sustainable energy transitions, including community engagement, stakeholder involvement, and equitable access to energy resources. - Analyze case studies of successful sustainable energy projects and apply lessons learned to real-world challenges in the energy sector. - 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Here are some possible learning outcomes for a course on sustainable energy: - Understand the principles of sustainable energy, including the environmental, social, and economic benefits and challenges of different sustainable energy options. - 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. - 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. - Apply interdisciplinary approaches to sustainable energy problem-solving, including integration of engineering, economics, policy, and social sciences. - 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. - Develop and present sustainable energy project proposals, incorporating technical, economic, and policy considerations. - Evaluate the potential for sustainable energy job creation and entrepreneurship, and develop strategies for promoting sustainable energy job creation and business development. - Understand the policy and regulatory frameworks for sustainable energy adoption and promotion, and develop strategies for advancing sustainable energy policy goals. - Analyze the technological, policy, and social barriers to sustainable energy adoption, and develop strategies for overcoming these barriers. - 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.
Indicative Contents المحتويات الإرشادية	Here are some possible indicative contents for a course on sustainable energy: - Introduction to Sustainable Energy - Definition and importance of sustainable energy - Overview of sustainable energy technologies and their impacts on the environment, society, and economy - Historical and current global energy trends and their implications - Energy Efficiency - Principles of energy efficiency and conservation

- Strategies for reducing energy consumption in buildings, transportation, and industry
- Case studies of successful energy efficiency initiatives
- 3. Solar Energy
 - Principles of solar energy conversion
 - Types of solar panels and their efficiency
 - Applications of solar energy in residential, commercial, and industrial settings
 - Solar energy policy and regulatory frameworks
- 4. Wind Energy
 - Principles of wind energy conversion
 - Types of wind turbines and their efficiency
 - Applications of wind energy in residential, commercial, and industrial settings
 - Wind energy policy and regulatory frameworks
- 5. Hydropower
 - Principles of hydropower generation
 - Types of hydropower systems and their efficiency
 - Advantages and disadvantages of hydropower
 - Hydropower policy and regulatory frameworks
- 6. Geothermal Energy
 - Principles of geothermal energy conversion
 - Types of geothermal systems and their efficiency
 - Applications of geothermal energy in residential, commercial, and industrial settings
 - Geothermal energy policy and regulatory frameworks
- 7. Bioenergy
 - Principles of bioenergy conversion
 - Types of bioenergy systems and their efficiency
 - Applications of bioenergy in residential, commercial, and industrial settings
 - Bioenergy policy and regulatory frameworks
- 8. Energy Storage
 - Principles of energy storage
 - Types of energy storage systems, including batteries, pumped hydro storage, and thermal energy storage
 - Role of energy storage in enabling the integration of renewable energy into the grid
 - Energy storage policy and regulatory frameworks
- 9. Fossil Fuels
 - Overview of the role of fossil fuels in the current energy system
 - Environmental and social impacts of fossil fuel use
 - Strategies for phasing out fossil fuels in favor of sustainable energy sources
 - Fossil fuel policy and regulatory frameworks
- 10. Sustainable Energy Policy
 - Overview of international and national sustainable energy policy frameworks
 - Case studies of successful sustainable energy policy initiatives
 - Strategies for advancing sustainable energy policy goals
 - Sustainable energy policy and regulatory frameworks
- 11. Technological Barriers to Sustainable Energy Adoption
 - Overview of technological barriers to scaling up sustainable energy systems
 - Case studies of successful technological innovations in sustainable energy
 - Strategies for overcoming technological barriers to sustainable energy adoption
- 12. Policy Barriers to Sustainable Energy Adoption

	- Overview of policy barriers to scaling up sustainable energy systems - Case studies of successful policy initiatives in sustainable energy - Strategies for overcoming policy barriers to sustainable energy adoption 13. Social and Cultural Dimensions of Sustainable Energy Transitions - Overview of community engagement and stakeholder involvement in sustainable energy transitions - Case studies of successful community-based sustainable energy projects - Strategies for promoting equitable access to sustainable energy resources 14. Sustainable Energy Job Creation and Entrepreneurship - Overview of job creation and entrepreneurship in the sustainable energy sector - Case studies of successful sustainable energy job creation and entrepreneurship initiatives - Strategies for promoting sustainable energy job creation and entrepreneurship 15. Sustainable Energy Project Presentations and Group Work - Students work in groups to develop and present sustainable energy project proposals, incorporating technical, economic, and policy considerations - Peer review and feedback on project proposals 16. Course Review and Future Directions - Review of course content and learning outcomes - Discussion of potential future directions in sustainable energy research, policy, and practice.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Here are some potential learning and teaching strategies for sustainable energy: 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. 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. 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. 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. 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. 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. 7. Incorporate field trips to sustainable energy facilities, such as wind farms, solar power plants, or hydropower installations. This can help students understand how

- sustainable energy systems operate in the real world and provide inspiration for their own sustainable energy projects.
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.
 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.
 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.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) 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 Sustainable Energy - Definition and importance of sustainable energy - Overview of sustainable energy technologies and their impacts on the environment, society, and economy - Historical and current global energy trends and their implications
Week 2	Energy Efficiency - Principles of energy efficiency and conservation - Strategies for reducing energy consumption in buildings, transportation, and industry - Case studies of successful energy efficiency initiatives
Week 3	Solar Energy - Principles of solar energy conversion - Types of solar panels and their efficiency - Applications of solar energy in residential, commercial, and industrial settings - Solar energy policy and regulatory frameworks
Week 4	Wind Energy

	- Principles of wind energy conversion - Types of wind turbines and their efficiency - Applications of wind energy in residential, commercial, and industrial settings - Wind energy policy and regulatory frameworks
Week 5	Hydropower - Principles of hydropower generation - Types of hydropower systems and their efficiency - Advantages and disadvantages of hydropower - Hydropower policy and regulatory frameworks
Week 6	Geothermal Energy - Principles of geothermal energy conversion - Types of geothermal systems and their efficiency - Applications of geothermal energy in residential, commercial, and industrial settings - Geothermal energy policy and regulatory frameworks
Week 7	Bioenergy - Principles of bioenergy conversion - Types of bioenergy systems and their efficiency - Applications of bioenergy in residential, commercial, and industrial settings - Bioenergy policy and regulatory frameworks
Week 8	Energy Storage - Principles of energy storage - Types of energy storage systems, including batteries, pumped hydro storage, and thermal energy storage - Role of energy storage in enabling the integration of renewable energy into the grid - Energy storage policy and regulatory frameworks
Week 9	Fossil Fuels - Overview of the role of fossil fuels in the current energy system - Environmental and social impacts of fossil fuel use - Strategies for phasing out fossil fuels in favor of sustainable energy sources - Fossil fuel policy and regulatory frameworks
Week 10	Sustainable Energy Policy - Overview of international and national sustainable energy policy frameworks - Case studies of successful sustainable energy policy initiatives - Strategies for advancing sustainable energy policy goals - Sustainable energy policy and regulatory frameworks
Week 11	Technological Barriers to Sustainable Energy Adoption - Overview of technological barriers to scaling up sustainable energy systems - Case studies of successful technological innovations in sustainable energy - Strategies for overcoming technological barriers to sustainable energy adoption
Week 12	Policy Barriers to Sustainable Energy Adoption - Overview of policy barriers to scaling up sustainable energy systems - Case studies of successful policy initiatives in sustainable energy - Strategies for overcoming policy barriers to sustainable energy adoption
Week 13	Social and Cultural Dimensions of Sustainable Energy Transitions - Overview of community engagement and stakeholder involvement in sustainable energy transitions - Case studies of successful community-based sustainable energy projects - Strategies for promoting equitable access to sustainable energy resources
Week 14	Sustainable Energy Job Creation and Entrepreneurship - Overview of job creation and entrepreneurship in the sustainable energy sector - Case studies of successful sustainable energy job creation and entrepreneurship initiatives - Strategies for promoting sustainable energy job creation and entrepreneurship
Week 15	Sustainable Energy Project Presentations and Group Work - Students work in groups to develop and present sustainable energy project proposals, incorporating technical, economic, and policy considerations - Peer review and feedback on project proposals
Week 16	Course Review and Future Directions - Review of course content and learning outcomes - Discussion of potential future directions in sustainable energy research, policy, and practice.
Learning and Teaching Resources مصادر التعلم والتدريس	

	Text	Available in the Library?
Required Texts	Here are some potential required texts for a course on sustainable energy: 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. 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. 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. 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. 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.	No
Recommended Texts	Here are some potential recommended texts for a course on sustainable energy: 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. 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. 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. 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. 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.	No

1. National Renewable Energy Laboratory (NREL) - <https://www.nrel.gov/>
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.
2. International Energy Agency (IEA) - <https://www.iea.org/>
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.
3. Clean Energy Ministerial (CEM) - <https://www.cleanenergyministerial.org/>
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.
4. Rocky Mountain Institute (RMI) - <https://rmi.org/>
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.
5. Energy.gov - <https://www.energy.gov/>
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.
6. Solar Energy Industries Association (SEIA) - <https://www.seia.org/>
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.
7. American Wind Energy Association (AWEA) - <https://www.awea.org/>
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.
8. The International Renewable Energy Agency (IRENA) - <https://www.irena.org/>
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.

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ 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	ahlam.ali@sc.uobaghdad.edu.iq	
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					
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

Module Objectives أهداف المادة الدراسية	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. 2. Develop an understanding of the techniques and methods used in geodetic measurements, including terrestrial, airborne, and space-based techniques. 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. 4. Develop proficiency in geodetic data analysis and interpretation, including error analysis, data quality assessment, and geodetic modeling. 5. Understand the applications of geodesy in various fields, including navigation, surveying, mapping, geophysics, and Earth sciences. 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.
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	7. Develop critical thinking and problem-solving skills in applying geodetic principles and techniques to real-world problems. 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	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. 2. Apply the techniques and methods used in geodetic measurements, including terrestrial, airborne, and space-based techniques. 3. Analyze and interpret geodetic data using appropriate tools and techniques, including error analysis, data quality assessment, and geodetic modeling. 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. 5. Apply geodetic principles and techniques to real-world problems in various fields, including navigation, surveying, mapping, geophysics, and Earth sciences. 6. Use geodetic software and tools effectively to acquire, process, and analyze geodetic data. 7. Demonstrate critical thinking and problem-solving skills in applying geodetic principles and techniques to real-world problems. 8. Evaluate the ethical, social, and legal implications of geodetic data collection and analysis, including issues related to privacy, security, and data sharing. 9. Communicate effectively, both orally and in writing, about geodetic concepts, methods, and results to diverse audiences. 10. Demonstrate an appreciation for the importance of geodesy in various fields and its impact on society.
Indicative Contents المحتويات الإرشادية	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. 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. 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. 4. Geodetic Data Analysis: Error analysis and data quality assessment in geodetic measurements. Geodetic modeling and parameter estimation. Analysis of time-series data. 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. 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. 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. 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.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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. 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. 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. 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. 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.

	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. 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. 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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) 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

Week	Material Covered
Week 1	1- Geodetic Surveying:- 1-1 History of surveying 2-1 Departments of surveying science 3-1 Surveying work 4-1 Geodesy 5-1 Geodesy and surveying
Week 2	1- Geodetic Surveying:- 6-1 History of geodesy 7-1 Applications of geodesy 6-1 Sections of geodesy
Week 3	2- Coordinates and calculations on the surface of the Earth:- 1-2 The shape of the Earth 2-2 Coordinate systems 3-2 Geographic or geodetic coordinates 4-2 Spherical coordinates
Week 4	2- Coordinates and calculations on the surface of the Earth:- 4-2 Spherical coordinates 5-2 Cartesian geodetic coordinates 6-2 Converting between coordinates
Week 5	2- Coordinates and calculations on the surface of the Earth:- 7-2 Projecting maps

	8-2 Projected coordinate systems
Week 6	3- Earth geodesy and networks of constants:- 1-3 Types of geostationary networks 2-3 Horizontal geostationary networks (triangle networks) 1-2-3 degree grids of triangles
Week 7	3- Earth geodesy and networks of constants:- 2-2-3 Steps to create triangle networks 3-2-3 Robustness of triangle networks
Week 8	Midterm Exam
Week 9	3- Earth geodesy and networks of constants:- 4-2-3 Obstacles in monitoring triangle networks 5-2-3 Conditions in triangle networks 6-2-3 Conditions for adjusting triangle networks
Week 10	3- Earth geodesy and networks of constants:- 3-3 Vertical geostationary networks (Robert networks)
Week 11	4- Setting geodetic networks:- 1-5 Sources and types of errors 2-4 General statistical principles 3-4 The principle of weight in cadastral measurements
Week 12	4- Setting geodetic networks:- 4-4 Network settings 5-4 Adjusting by the sum of least squares is 1-5-4 Adjusting the least squares for observational equations
Week 13	4- Setting geodetic networks:- 2-5-4 Adjusting least squares for nonlinear equations 3-5-4 Setting the least squares for condition equations
Week 14	5- Advanced Geodetic Surveying:- 1-5- Geodesic frame of reference
Week 15	5- Advanced Geodetic Surveying:- 2-5- Physical Geodetic
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	1- Introduction to Geodetic surveying • Geodetic surveying sections
Week 2	2- Coordinate Systems • Organize coordinates • Types of coordinate systems • Set of spatial coordinates
Week 3	2- Coordinate Systems • A set of geographic coordinates • Plane coordinate system.
Week 4	2- Coordinate Systems • The relationship between spatial and geographic coordinates • Calculating the length and deviation of a side given its plane coordinates
Week 5	3- Triangle Networks and Geodesic Budget • Degrees of triangle networks • A comparison table between the degrees of triangle networks.
Week 6	3- Triangle Networks and Geodesic Budget • Types of networks

	• Where is the milk? • Geodetic budget and its types
Week 7	3- Triangle Networks and Geodesic Budget • Accurate budget. • Budget purposes • Accurate scale • Exact dictionaries • Features of dictionaries:
Week 8	Midterm Exam
Week 9	3- Triangle Networks and Geodesic Budget • Precautions to be taken into account: Make an accurate budget • Necessary corrections to meteorology 2 mesa • Triangle budget
Week 10	4- Constructing a triangle network • Exploration and pinpointing • Conditions for choosing a base line • Identify the device used for monitoring
Week 11	4- Constructing a triangle network • Types of total station devices • Total Station Device (Power Set 2010) • The main parts of the device
Week 12	4- Constructing a triangle network • Device care • How to use the device • General sketch of the selected network: • Meteorological errors and overcoming them
Week 13	5- Monitoring and correcting the triangle grid • Observations of horizontal and vertical angles • Meteorological table for angles • Table of vertical angle observations • Base line measurement • Corrections to the measured distance to the base line
Week 14	5- Monitoring and correcting the triangle grid • Adjusting the grid (calculating average horizontal angle observations(• Correcting network shapes • Explain how to solve a quadrilateral with two diagonals observed by the approximate method • Table No. (1) to adjust the quadrilateral shape with the observed diagonals • Explain how to solve a quadrilateral with a center
Week 15	5- Monitoring and correcting the triangle grid • Solution table for the concentric figure • Final corrected angles of the mesh • Calculate the side lengths of the network • Calculating the deviations of the mesh sides • Calculate the levels of grid points using the triangular budget • Drawing a network of triangles using a real-time computer (AutoCAD program(• The final general shape of the triangle network
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"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. "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. "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)	No
Recommended Texts	"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. "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. "Geodesy: The Concepts" by Petr Vaníček 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.	No
Websites	- NOAA's National Geodetic Survey (NGS) - https://www.ngs.noaa.gov/ 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. - National Space-Based Positioning, Navigation, and Timing (PNT) Center of Excellence - https://spacecenter.gwu.edu/ 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. - GEO++ - http://geopp.unil.ch/ This site provides free educational materials on geodesy and geospatial technologies. It includes slides, videos, and exercises, primarily focused on GNSS geodesy. - European Space Agency (ESA) GNSS website - https://www.esa.int/Applications/Observing_the_Earth/GNSS ESA has multiple GNSS satellites and provides information and data useful for geodesy, including precise GPS/GNSS orbit products.	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	Analytical geometry and differential equations			Module Delivery	
Module Type	B			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	RSGIS23113				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGII	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	

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 أهداف المادة الدراسية	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 students will be able to: Analytical Geometry:
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	• Define and understand fundamental concepts in analytical geometry, including points, lines, planes, vectors, curves, and surfaces. • Explain the relationship between geometric objects and their algebraic representations. • Apply geometric transformations and understand their impact on geometric objects. • Problem Solving: • Determine the equation of a line, plane, or curve given specific conditions. • Find the distance between points, lines, and planes. • Calculate the angle between lines, planes, and vectors. • Analyze and solve geometric problems using analytical methods. • Applications: • Apply analytical geometry concepts to solve real-world problems in various fields. • Utilize geometric modeling techniques to represent and analyze complex systems. • Understand the role of analytical geometry in computer graphics and other related fields. Differential Equations: • Define and understand different types of differential equations, including ordinary and partial differential equations. • Explain the concept of order and degree of a differential equation. • Identify the type of differential equation and its appropriate solution method. • Problem Solving: • Solve first-order and second-order linear differential equations using various methods, including separation of variables, integrating factors, and variation of parameters. • Apply techniques to solve non-linear differential equations. • Utilize numerical methods to approximate solutions to differential equations. • Applications: • Apply differential equations to model and solve real-world problems in physics, engineering, biology, and other fields. • Understand the role of differential equations in describing phenomena such as population growth, radioactive decay, and heat transfer. • Utilize differential equations to analyze and predict the behavior of complex systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• 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. • Enhance problem-solving skills and critical thinking abilities: Students will develop the ability to analyze problems, identify appropriate methods, and solve them effectively. • 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. • 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.

	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.
Indicative Contents المحتويات الإرشادية	his 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: I. Analytical Geometry 1. Fundamentals of Analytical Geometry * Coordinate systems: Cartesian, polar, cylindrical, and spherical coordinates. * Distance formula and midpoint formula. * Vectors in two and three dimensions: addition, subtraction, scalar multiplication, dot product, cross product. * 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.
- **Feedback and Support:** 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.
- **Differentiated Instruction:** Cater to diverse learning styles and needs:
 - **Multiple learning modalities:** Provide materials in various formats (text, audio, video) to cater to different learning preferences.
 - **Flexible pacing:** Allow students to work at their own pace and provide additional support as needed.
 - **Collaborative learning groups:** Group students with different strengths and weaknesses to promote peer learning and support.

Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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 Analytical Geometry: Coordinate Systems, Distance Formula, Midpoint Formula, Vectors in 2D and 3D.
Week 2	Vectors, Dot Product, Cross Product: Dot Product, Cross Product, Applications of Vectors.
Week 3	Lines in 2D and 3D: Equation of a Line, Slope-Intercept Form, Point-Slope Form, Parametric Equations, Vector Form.
Week 4	Planes in 3D: Equation of a Plane, Normal Vector, Distance from a Point to a Plane.
Week 5	Conic Sections: Circle: Circle, Equation of a Circle, Standard Form, General Form.
Week 6	Conic Sections: Parabola: Equation of a Parabola, Focus, Directrix, Vertex.
Week 7	Midterm Exam
Week 8	Conic Sections: Ellipse, Equation of an Ellipse, Foci, Major and Minor Axes, Eccentricity.
Week 9	Conic Sections: Hyperbola, Equation of a Hyperbola, Foci, Asymptotes, Eccentricity with an

	applications of Analytical Geometry: Geometric Modeling, Computer Graphics, Optimization Problems.
Week 10	Introduction to Differential Equations: Definition and Classification of Differential Equations, Order, Degree, Formation of Differential Equations, Existence and Uniqueness of Solutions
Week 11	First-Order Differential Equations: Separable and Linear: Separable Equations, Linear Equations, Integrating Factors
Week 12	First-Order Differential Equations: Exact Equations and Applications: Exact Equations, Applications of First-Order Differential Equations
Week 13	Second-Order Linear Differential Equations: Homogeneous: Homogeneous Second-Order Linear Differential Equations, Characteristic Equations
Week 14	Second-Order Linear Differential Equations: Non-Homogeneous Second-Order Linear Differential Equations, Method of Undetermined Coefficients, Variation of Parameters
Week 15	Applications of Differential Equations: Modeling Physical Systems, Engineering Applications, Biology
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus: Early Transcendentals by James Stewart Calculus: Early Transcendentals by Ron Larson and Bruce Edwards. Thomas' Calculus: Early Transcendentals by George B. Thomas, Jr. and Maurice D. Weir.	Yes
Recommended Texts	Elementary Differential Equations and Boundary Value Problems by William E. Boyce and Richard C. DiPrima. Differential Equations with Boundary-Value Problems by Dennis G. Zill and Michael R. Cullen. A First Course in Differential Equations by Dennis G. Zill.	Yes
Websites	- Khan Academy. - MIT Open Courseware - and Wolfram Alpha	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	Geographic Information Systems I			Module Delivery	
Module Type	C			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ 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	ebtesam.khanjer@sc.uobaghdad.edu.iq	
Module Leader's Acad. Title		Professor	Module Leader's Qualification		Ph.D.
Module Tutor	Reem Shihab Hameed		e-mail	reem.hameed1204@sc.uobaghdad.edu.iq	
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 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. 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. 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. 4. Data management: Students should be able to organize, manage, and store spatial data, including creating and managing spatial databases. 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. 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.
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Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define GIS, identify its components, and explain its applications in various fields. 2. Differentiate between vector and raster data, and use GIS software to represent and manipulate spatial data. 3. Use GIS software to create maps, analyze spatial data, and query databases. 4. Organize, manage, and store spatial data, including creating and managing spatial databases. 5. Select and use appropriate coordinate systems and projections for GIS projects. 6. Create effective maps using GIS software, including selecting appropriate symbology, creating map layouts, and communicating spatial information effectively. 7. Perform basic spatial analysis tasks, such as overlaying and buffering spatial data, and interpret the results of these analyses. 8. Identify and explain real-world applications of GIS, such as urban planning, environmental management, and disaster response. 9. Apply ethical principles when working with spatial data, including issues related to privacy, data ownership, and data accuracy. 10. Effectively communicate and collaborate with others on GIS projects, including presenting GIS analyses and contributing to group projects. 11. Evaluate the strengths and limitations of GIS technology and its potential impact on society. 12. Demonstrate proficiency in using GIS software and tools through completing GIS projects and assignments.
Indicative Contents المحتويات الإرشادية	1. Introduction to GIS: Definition of GIS, history of GIS, and explanation of its applications in various fields. 2. Spatial Data: Vector and raster data, coordinate systems and projections, data formats, and data sources. 3. GIS Software: Overview of popular GIS software, such as ArcGIS or QGIS, and introduction to basic GIS functionalities. 4. Data Management: Data input, data organization, data storage, data retrieval, and metadata. 5. Cartography: Map design principles, cartographic elements, and map production using GIS software. 6. Spatial Analysis: Spatial queries, spatial analysis operations, and spatial statistics. 7. Real-world Applications: Examples of GIS applications in various fields, such as urban planning, environmental management, and disaster response. 8. Data Ethics: Ethical considerations and principles related to GIS data collection, processing, and dissemination. 9. Group Projects: Collaborative projects in which students apply GIS concepts and skills to real-world problems and situations. 10. GIS Project Management: Project planning, project design, and project implementation. 11. GIS Project Presentation: Presentation of GIS projects using appropriate communication tools.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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. 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. 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. 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. 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. 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. 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. 8. Online Resources: The instructor can provide online resources, such as videos, tutorials, blogs, and discussion forums, to support learning outside the classroom.
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا	
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا
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Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعياً	
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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 الأسبوعي النظري

	Material Covered
Week 1	Introduction to GIS - Definition of GIS - Brief history of GIS - Components of a GIS system - Applications of GIS
Week 2	GIS Software - Overview of popular GIS software (e.g. ArcGIS or QGIS) - Basic GIS functionalities - File formats and data types used in GIS
Week 3	Spatial Data - Vector and raster data - Coordinate systems and projections - Data sources (e.g. GPS, remote sensing)
Week 4	Data Management - Data input and editing - Data storage and retrieval - Metadata
Week 5	Cartography - Map design principles - Cartographic elements - Map production using GIS software
Week 6	Why GIS: Advantages of GIS GIS Development
Week 7	GIS Application Major Services in GIS
Week 8	Exam
Week 9	: Accuracy and Error - Sources of error in GIS data - Measures of accuracy - Error propagation
Week 10	Geographic coordinate system (GCS) Graticule Spheroids and spheres World Geodetic System Datums
Week 11	Web GIS - Overview of web GIS - Web mapping and web services - Open data and open source GIS

Week 12	projected coordinate systems Conic (tangent) , Projection types A cone is placed over a globe Cylindrical Projection Planar projection
Week 13	Final Project Planning - Collaborative project in which students apply GIS concepts and skills to a real-world problem or situation - Project planning and design
Week 14	: Final Project Implementation - Implementation of the final project - Troubleshooting and problem-solving
Week 15	Final Project Presentation - Presentation of GIS project using appropriate communication tools - Course wrap-up and review
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الأسبوعي العملي

	Material Covered
Week 1	Introduction of GIS (software package) and tools -Arc Map(Arc Toolbox, Arc Object, Arc Seen) -Arc Catalog
Week 2	Spatial Data - Vector Data (Point, Line, polyline, Polygon) - Coordinate systems and projections
Week 3	Data Management - Data input and editing - Data storage and retrieval
Week 4	Vector Data - Geodatabase -Query
Week 5	Spatial Data - Raster Data - Metadata
Week 6	Pre-processing Raster Data -Image correction - Composite bands
Week 7	Pre-processing Raster Data -Clipping - Mosaic
Week 8	Exam
Week 9	Environmental management applications - Spectral indices
Week 10	Conversion Tools
Week 11	Cartography Tools
Week 12	Geographic reference
Week 13	Spatial Analyst Tools
Week 14	Present projects in package form
Week 15	Map Layout
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
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Required Texts	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. 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. 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. 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. 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.	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. 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. 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. 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. 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. 2. QGIS: [https://qgis.org/en/site/ ↗](https://qgis.org/en/site/) - This website provides resources for QGIS software, including tutorials, documentation, and plugins. 3. USGS Earth Explorer: [https://earthexplorer.usgs.gov/ ↗](https://earthexplorer.usgs.gov/) - This website provides free access to satellite imagery data from the USGS. 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. 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. 6. GIS Lounge: https://www.gislounge.com/ - This website provides news, tutorials, and articles related to GIS technology and applications. 7. Geoawesomeness: https://geoawesomeness.com/ - This website provides news, tutorials, and articles related to geospatial technology and applications.			
Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition

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Success Group (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 (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	Meteorology and climate change			Module Delivery	
Module Type	C			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	RSGIS23012				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		UGII	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	

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 أهداف المادة الدراسية	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: 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. 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. 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. 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. 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. 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. 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	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: 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. 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. 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. 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. 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. 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. 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. 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 opportunities presented by climate change.
Indicative Contents المحتويات الإرشادية	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: 1. Introduction to Meteorology: - The Earth's atmosphere and its composition - The factors that influence weather patterns - The different types of weather phenomena 2. Climate Change: - The natural and human-induced causes of climate change - The impact of climate change on the environment, ecosystems, and human societies - Climate change mitigation and adaptation strategies 3. Atmospheric Science: - The physics and chemistry of the atmosphere - The role of the atmosphere in climate and weather patterns - The impact of atmospheric pollution on human health and the environment 4. Climate Data and Analysis: - Understanding climate data, including temperature, precipitation, and atmospheric conditions - Using climate data to identify trends and patterns in weather and climate - Evaluating the impact of climate change on the environment and human societies 5. Climate Modeling: - The principles of climate modeling - The different types of climate models and their applications - The limitations and uncertainties of climate modeling 6. Policy and Societal Impacts: - The role of policy in addressing climate change - The impact of climate change on vulnerable populations, including low-income communities and indigenous peoples - The ethical considerations of climate change and environmental justice 7. Communication and Outreach: - Effective communication strategies for explaining scientific concepts and data to different audiences - Engaging in discussions about policy and societal impacts of climate change - Communicating about climate change in the media and in public discourse 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.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	

Strategies

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:

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 multimedia resources such as videos, animations, and images to help students visualize abstract concepts.
2. **Discussions:** 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.
3. **Hands-on Exercises:** 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.
4. **Case Studies:** 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.
5. **Field Trips:** 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.
6. **Online Resources:** 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.

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.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعاً

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	
Total SWL (h/sem) 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 Meteorology - The Earth's atmosphere and its composition - The factors that influence weather patterns - The different types of weather phenomena
Week 2	Introduction to Meteorology - The Earth's atmosphere and its composition - The factors that influence weather patterns - The different types of weather phenomena
Week 3	Atmospheric Science - The physics and chemistry of the atmosphere - The role of the atmosphere in climate and weather patterns - The impact of atmospheric pollution on human health and the environment
Week 4	Atmospheric Science - The physics and chemistry of the atmosphere - The role of the atmosphere in climate and weather patterns - The impact of atmospheric pollution on human health and the environment
Week 5	Planetary wind system - Pressure and wind system - General circulation of atmosphere - Monsoon
Week 6	Climate Data and Analysis - Understanding climate data, including temperature, precipitation, and atmospheric conditions - Using climate data to identify trends and patterns in weather and climate - Evaluating the impact of climate change on the environment and human societies
Week 7	Climate Modeling - The principles of climate modeling - The different types of climate models and their applications - The limitations and uncertainties of climate modeling
Week 8	Climate Modeling - The principles of climate modeling - The different types of climate models and their applications - The limitations and uncertainties of climate modeling
Week 9	Climate Change - The natural and human-induced causes of climate change - The impact of climate change on the environment, ecosystems, and human societies - Climate change mitigation and adaptation strategies
Week 10	Climate Change - The natural and human-induced causes of climate change - The impact of climate change on the environment, ecosystems, and human societies - Climate change mitigation and adaptation strategies
Week 11	Policy and Societal Impacts - The role of policy in addressing climate change

Required Texts	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: 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. 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. 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. 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. 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. 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.	No
Recommended Texts	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: 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. 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. 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. 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. 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. 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.	No

Websites	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:
	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. 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. 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. 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. 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. 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.

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	Computer II			Module Delivery	
Module Type	B			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOB203				
ECTS Credits	3				
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	
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 أهداف المادة الدراسية		☐ To introduce students to fundamental programming concepts using Python. ☐ To develop problem-solving skills and logical thinking through coding exercises. ☐ To provide hands-on experience with Python for data manipulation and analysis. ☐ To prepare students for advanced topics in computer science and software development.			
Module Learning Outcomes مخرجات التعلم للمادة الدراسية		☐ Understand and apply basic programming constructs: variables, data types, and control structures. ☐ Develop, test, and debug Python programs. ☐ Use Python libraries for data handling and analysis. ☐ Write reusable and modular code using functions and modules. ☐ Implement data structures such as lists. ☐ Apply object-oriented programming concepts in Python.			
Indicative Contents المحتويات الإرشادية		☐ Introduction to Python and its environment. ☐ Basic syntax and semantics of Python. ☐ Control structures: loops and conditionals. ☐ Functions: definition, scope, and recursion. ☐ Data structures: lists. ☐ File handling and exceptions. ☐ Introduction to libraries for data analysis (e.g., pandas, numpy).			
Learning and Teaching Strategies استراتيجيات التعلم والتعليم					
Strategies		☐ Lectures to introduce theoretical concepts. ☐ Practical lab sessions for hands-on experience. ☐ Weekly assignments to reinforce learning. ☐ Group projects to encourage collaboration. ☐ Continuous assessment through quizzes and tests.			
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا					
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل			Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا		

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

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Severance, Charles. Python for everybody: Exploring Data using .python 3. Charles Severance, 2016	Available in the Library ?
Required Texts	Python for Everybody: Exploring Data in Python 3, by Charles Severance	No
Recommended Texts	☐ Automate the Boring Stuff with Python, by Al Sweigart ☐ Learning Python, by Mark Lutz	No
Websites	☐ Python Official Documentation ☐ W3Schools Python Tutorial ☐ GeeksforGeeks Python	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A – Excellent	امتياز	90 - 100	Outstanding Performance
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	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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Module Information

معلومات المادة الدراسية

Module Title	Baath Regime Crimes in Iraq			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOB105				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		UGII	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 أهداف المادة الدراسية	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 : 1. فهم مفهوم الجرائم وأقسامها. 2. دراسة جرائم نظام البعث والقوانين المتعلقة بها. 3. التعرف على الجرائم النفسية والاجتماعية وآثارها على الفرد والمجتمع. 4. تحليل الانتهاكات القانونية في العراق، بما في ذلك الانتهاكات لحقوق الإنسان والجرائم ذات الصلة. 5. فهم الجرائم البيئية وآثارها، بما في ذلك التلوث وتدمير المدن والقرى وتجفيف الأهوار. دراسة جرائم المقابر الجماعية وفهم أحداث المقابر والتصنيف الزمني لها في العراق.			
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. فهم مفهوم الجرائم وقدرة الطلاب على تصنيف الجرائم وفقاً لأقسامها. 2. تحليل جرائم نظام البعث وفهم القوانين المتعلقة بها، بما في ذلك الجرائم الدولية. 3. القدرة على التعرف على الجرائم النفسية لنظام البعث وفهم الآثار النفسية لجرائم نظام البعث على الأفراد والمجتمع. 4. القدرة على التعرف على الجرائم الاجتماعية لنظام البعث الآثار الاجتماعية لجرائم نظام البعث على الأفراد والمجتمع. 5. التعرف على الانتهاكات القانونية لنظام البعث في العراق وفهم أنواع الانتهاكات ومكان احتجاز الأفراد. 6. التعرف على صور انتهاكات حقوق الإنسان وجرائم السلطة التي وقعت خلال فترة نظام البعث 7. التعرف على الانتهاكات السياسية والعسكرية لنظام البعث 8. فهم الجرائم البيئية لنظام البعث والقدرة على تحليل تأثيرها على البيئة والمجتمع. 9. دراسة جرائم المقابر الجماعية لنظام البعث فهم الأحداث المرتبطة بجرائم المقابر الجماعية وتصنيفها زمنياً.			
Indicative Contents المحتويات الإرشادية	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 وآثارها 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 اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/ 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 واصطلاحًا، 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 الأهوار 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

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Group Success Group (50 - 100)	Grade	التقدير	Marks (%)	Definition
	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
Fail Group (0 – 49)	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
	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	<u>C</u>			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	<u>RSGIS24014</u>				
ECTS Credits	<u>6</u>				
SWL (hr/sem)	<u>150</u>				
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	
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Co-requisites module	None	Semester	
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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. Understand the basic principles of blackbody radiation and the origin of electromagnetic radiation from objects. 2. Describe the electromagnetic spectrum and the different spectral regions used in remote sensing. 3. Understand the principles of energy and matter interactions with electromagnetic radiation, including absorption, emission and scattering. 4. Explain the principles of radiative transfer and atmospheric interactions that affect electromagnetic radiation propagating through the atmosphere. 5. Describe the concepts of spatial, spectral, radiometric and temporal resolution in remote sensing and how they influence data quality. 6. Apply the equations for radiance, irradiance and brightness temperature to solve remote sensing radiometry problems. 7. Calculate signal-to-noise ratio and understand factors affecting sensor performance. 8. Describe the physics principles of various remote sensing platforms and sensor types including multispectral, hyperspectral, thermal and LiDAR systems. 9. Analyze and interpret remote sensing images and derive geophysical parameters from the image data using appropriate radiative transfer models. 10. Develop an understanding of emerging remote sensing technologies and their potential applications. 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Students will understand the physical principles of blackbody radiation and the origin of electromagnetic radiation from different objects and materials. • Students will be able to describe the electromagnetic spectrum utilized for remote sensing and explain the spectral signatures of earth surface features. • Students will understand the principles of energy and matter interactions with electromagnetic radiation including absorption, emission and scattering. • 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. • Students will be able to apply the relevant radiometry equations to solve remote sensing problems involving radiance, irradiance, reflectance and brightness temperature. • Students will be able to interpret sensor performance parameters such as signal-to-noise ratio and understand factors affecting them. • Students will understand the principles of operation and capabilities of different remote sensing platforms and sensor types. • Students will be able to analyze and interpret remote sensing images and extract geophysical parameters using appropriate radiative transfer models. • Students will develop an awareness of emerging remote sensing technologies and their potential applications. • Students will be able to communicate technical concepts related to the physics of remote sensing clearly and precisely in speech and writing.

	The key difference between objectives and outcomes is that: - Objectives describe what students will learn and skills they will develop. - Outcomes describe what students will be able to do by the end of the course as a result of achieving the objectives.
Indicative Contents المحتويات الإرشادية	- Introduction - Overview of remote sensing concepts and applications - Electromagnetic radiation and the electromagnetic spectrum - Blackbody radiation and radiation laws - Blackbody radiation and Planck's law - Stefan-Boltzmann and Wien's displacement laws - Interactions of radiation with matter - Reflection, absorption and emission - Transmission and scattering - Radiometry - Definition of radiometric terms: radiance, irradiance, reflectance - Brightness temperature - Sensor performance parameters - Remote sensing platforms and sensors - Platforms: satellite, airborne, UAV - Multispectral, hyperspectral, thermal and LiDAR sensors - Atmospheric effects - Absorption, transmission and scattering in atmosphere - Atmospheric correction - Spatial, spectral, radiometric and temporal resolution - Factors determining resolution - Effects on data quality - Radiative transfer models - Forward and inversion models - Case studies using models - Advanced topics - Emerging technologies and applications - Recent research trends

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	- Lectures: Initial introduction of concepts, theories and derivations through formal lectures. This provides a unified presentation of foundational knowledge. - Demonstrate examples: Use plenty of examples to demonstrate application of physics principles to remote sensing problems. Work through sample calculations step-by-step. - Assign practical work: Give regular assignments involving interpreting remote sensing data and applying radiative transfer models. Provide feedback to reinforce understanding. - Use of software: Integrate the use of remote sensing software tools like ENVI, ERDAS and SNAP early on. Students can practice analyzing real data. - Group activities: Assign group projects requiring students to propose solutions to remote sensing problems or interpret case studies. This fosters collaborative skills.
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	- Tutorials: Include tutorial sessions where students work through example problems and calculations under supervision. This develops practical skills. - Use multiple representations: Explain concepts using graphical, algebraic, verbal and concrete data representations. Students make connections across representations. - Discussions: Have in-class discussions for students to share strategies for solving challenging application problems. This stimulates higher-order thinking. - Formative assessments: Use frequent low-stakes quizzes, exercises and checks for understanding. This helps identify gaps and difficulties for remediation. - Summative assessments: Use midterms and final exams to assess overall learning at checkpoints. This ensures accountability. - Provide support: Offer office hours, study groups and additional resources for students struggling with concepts. Adjust pace and provide alternatives where needed. 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.
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Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) 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 Remote Sensing - Definitions, electromagnetic spectrum, active vs passive sensing
Week 2	Electromagnetic Radiation - Wave theory, electromagnetic spectrum, blackbody radiation
Week 3	Atmosphere and Atmospheric Effects - Attenuation, scattering, absorption, atmospheric windows
Week 4	Radiative Transfer - Emission, reflection, refraction, radiance, irradiance, BRDF
Week 5	Optics and Imaging Systems - Lenses, mirrors, diffraction, resolution, MTF, focal plane arrays

Week 6	Spectroscopy - Line spectra, band spectra, spectral signatures, spectral resolution
Week 7	Thermal Emission and Microwave Radiation - Planck's law, Rayleigh-Jeans approximation, microwave bands
Week 8	Image Acquisition and Processing - Sampling, quantization, preprocessing, image enhancement
Week 9	Active Microwave Sensing - SAR, InSAR, radar polarimetry, radar interferometry, lidar
Week 10	Optical and Thermal Passive Sensing - Multispectral vs hyperspectral sensing, thermal bands
Week 11	Principles of Image Analysis and Classification - Pixels, objects, shape, texture, pattern, classification
Week 12	Platforms and Sensors - Satellites, aircraft, UAVs, Landsat, MODIS, Hyperion etc.
Week 13	Applications of Remote Sensing - Land cover, agriculture, forestry, geology, oceanography, environment
Week 14	Integration of Remote Sensing and GIS - Georeferencing, data models, analysis and modelling
Week 15	Emerging Trends - UAVs, lidar, hyperspectral sensing, data mining, cloud computing
Week 16	Student Presentations on Selected Remote Sensing Applications

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library ?
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Required Texts	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. 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. 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. 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. 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.	No
Recommended Texts	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. 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. 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.	No

Websites	- NASA Earth Observatory - https://earthobservatory.nasa.gov/ 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. - Environment Canada - https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/remote-sensing.html Environment Canada's remote sensing page has useful information, data and tools relating to remote sensing applications over Canada. - NASA Remote Sensing Tutorial - https://fm.cua.edu/HD38_RST/ This comprehensive tutorial covers the physical principles of remote sensing and the components and functions of remote sensing systems. - USGS Landsat Missions - https://www.usgs.gov/land-resources/nli/landsat The USGS Landsat website has information on the Landsat satellite missions, data access, educational resources, and a glossary of remote sensing terms. - ISPRS TC VII - https://www.isprs.org/commission7/ The International Society for Photogrammetry and Remote Sensing - Commission VII focuses on sensor systems, instrument calibration and radiometric aspects.
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Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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 II	Module Delivery
Module Type	C	☒ Theory ☒ Lecture ☒ Lab
Module Code	RSGIS24015	

ECTS Credits	8		☐ Tutorial ☐ Practical ☐ Seminar	
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

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

Module Objective اهداف المادة الدراسية	Here are some learning objectives for a course on digital image processing: 1. To understand the sensing, acquisition and storage of digital images. 2. To study the image fundamentals and mathematical transforms necessary for image processing. 3. To understand the digital processing systems and corresponding terminology. 4. To understand the base image transformation domains and methods. 5. To have an understanding of colour models, type of image representations and related statistics. 6. To study the image enhancement techniques. 7. To study image restoration. 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.
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Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing a course on digital image processing , students should be able to: 1. Have a clear understanding of the principals the Digital Image Processing terminology used to describe features of images. 2. Have a good understanding of the mathematical foundations for digital manipulation of images; image acquisition; preprocessing; Fourier domain processing. 3. Be able to write programs using Matlab language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression. 4. Have knowledge of the Digital Image Processing Systems. 5. Be able to understand the documentation for, and make use of, the MATLAB library and MATLAB Digital Image Processing Toolbox (IPT). 6. Learn and understand the Image Enhancement in the Spatial Domain. 7. Learn and understand the Image Enhancement in the Frequency Domain. 8. Understand the Image Restoration, Representation and Description. Finally, The students would get a firm foundation in 2-D image processing and be able to handle real-world image processing problems.
Indicative Contents المحتويات الإرشادية	Here are some indicative contents that may be covered in a course on digital image processing : 1. Image sources and generation 2. Image sampling and quantization 3. Same basic relationship between pixels 4. Intensity transformations and spatial filtering background. 5. Some Basic Intensity Transformation Functions 6. Histogram Processing 7. Fundamentals of Spatial Filtering 8. Smoothing Spatial Filters 9. Sharpening Spatial Filters 10. Combining Spatial Enhancement Methods 11. The Discrete Fourier Transform (DFT) of one Variable 12. Extension to Functions of Two Variables 13. Some Properties of the 2-D Discrete Fourier Transform 14. The Basics of Filtering in the Frequency Domain 15. Image Smoothing Using Frequency Domain Filters 16. Image Sharpening Using Frequency Domain Filters 17. Basic Image Rrestoration techniques
Learning and Teaching Strategies ستراتيجيات التعلم والتعليم	
Strategies	Here are some learning and teaching strategies that may be effective for a course on Digital image processing : 1. Lectures: Lectures can provide an overview of key concepts and techniques in digital image processing. 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 11. Education: resolving some questions, with intent to contain mistakes and make the students extracted error 12. Learning: asking questions and inquiries and making the student turn into a teaching explanation and solution on the blackboard at that point, brainstorming method 13. Learning: questions directly and consequently all students to learn the extent

- of interaction and the rest to be paid attention to
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.
 15. Instructors can use slides, diagrams, and other visual aids to help students understand complex topics.
 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.
 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.

Student Workload (SWL) الحمل

الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي الغير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي الغير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي 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 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.
Week 2	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
Week 3	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
Week 4	Digital image Representation: Converting Between data classes and Image Types. Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations. Histogram Processing
Week 5	Image Enhancement in the Spatial Domain: Enhancement Using Arithmetic and Logic operations Combining Spatial Enhancement Methods. Basics of Spatial Filters
Week 6	Image Enhancement in the Spatial Domain: Smoothing and Sharpening Spatial Filters.
Week 7	Image Enhancement in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain. Computing and visualizing the 2D DFT.
Week 8	Convolution and correlation. Image Enhancement in the Frequency Domain: Smoothing Frequency Domain Filters
Week 9	Image Enhancement in the Frequency Domain: Sharpening Frequency Domain Filters. Homomorphic Filtering. Wavelet Transform. Haar Transform.
Week 10	Image Restoration: A model of The Image Degradation / Restoration Process. Noise Models. Restoration in the presence of Noise Only Spatial Filtering.
Week 11	Image Restoration: Periodic Noise Reduction by Frequency Domain Filtering. Linear Position-Invariant Degradations. Estimation of Degradation Function.
Week 12	Image Restoration: Inverse filtering. Wiener filtering
Week 13	Image Restoration: Geometric Mean Filter. Geometric Transformations.
Week 14	Object Recognition: Patterns and Pattern Classes. Decision-Theoretic Methods. Structural Methods
Week 15	Course review, final project presentations, and exam preparation.
Week 16	Preparatory week before the final Exam
	Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبرات
	Material Covered
Week 1	Image reading and Printing.

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

		Available in the Library?
Required Texts	Here are some required texts for a course on digital image processing: 1. Digital Image Processing, Second Edition by Rafael C. Gonzalez and Richard E. Woods, Pearson Education 2. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI 3. Fundamentals of Digital Image Processing by Anil K Jain, PHI 4. Digital Image Processing Using Matlab, Rafael C. Gonzalez and Richard E. Woods, Pearson Education.	No
Recommended Texts	Here are some recommended texts for a course on digital image processing: 3. Al Bovik (ed.), "Handbook of Image and Video Processing", Academic Press, 2000. 4. 2. A.K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall, Addison-Wesley, 1989. 3. M. Petrou, P. Bosdogianni, "Image Processing, The Fundamentals", Wiley, 1999. 4. P. Ramesh Babu, Digital Image Processing. Scitech Publications., 2003. 5. Bernd Jähne, Digital Image Processing, Springer-Verlag Berlin Heidelberg 2005. 6. B. Jähne, "Practical Handbook on Image Processing for Scientific Applications", CRC Press, 1997. 7. J. C. Russ. The Image Processing Handbook. CRC, Boca Raton, FL, 4th edn., 2002. 8. J. S. Lim, "Two-dimensional Signal and Image Processing" Prentice-Hall, 1990. 9. Rudra Pratap, Getting Started With MATLAB 7. Oxford University Press, 2006	No

	10. W. K. Pratt. Digital image processing, PIKS Inside. Wiley, New York, 3rd, edn., 2001. 11. Stephane Marchand-Maillet, Yazid M. Sharaiha, Binary Digital Image Processing, A Discrete Approach, Academic Press, 2000.	
Websites	1. www.imageprocessingplace.com (required). Text book website) 2. www.mathworks.com (MATLAB documentation) 3. en.wikipedia.org/wiki/Digital image processing (General image processing concepts)	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	Hydrology	Module Delivery
Module Type	<u>C</u>	☒ Theory ☒ Lecture ☒ Lab
Module Code	<u>RSGIS24016</u>	

ECTS Credits	<u>3</u>	☐ Tutorial ☐ Practical ☐ Seminar	
SWL (hr/sem)	<u>75</u>		
Module Level	UGII	Semester of Delivery	4
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	عبير 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

Module Objectives أهداف المادة الدراسية	- Understand the hydrological cycle and the processes that drive it. - Describe the different types of precipitation and their measurement methods. - Explain the factors that affect evapotranspiration and the techniques used to estimate it. - Understand infiltration processes and soil water properties, and describe water movement in soils. - Describe groundwater properties, aquifer types, and groundwater flow. - Understand surface water properties, streamflow measurement, and streamflow hydrographs. - Explain hydrologic routing methods and flood routing. - Understand snow accumulation and melt processes, snow water equivalent, and snowmelt modeling. - Describe water quality parameters, sources of pollution, and water quality modeling. - Understand watershed characteristics, watershed modeling, and water resources planning. - Develop an understanding of water resources planning and management, water allocation, and water conservation. - Understand the impacts of climate change on hydrology, adaptation strategies, and mitigation measures. - Develop conceptual and physical models for hydrological modeling and understand model calibration and validation. - Apply GIS applications in hydrology, spatial analysis, and modeling. - Interpret remote sensing data for hydrology, including image interpretation and classification techniques.
Module Learning Outcomes	Describe the hydrological cycle and its components, including precipitation, evapotranspiration, infiltration, groundwater, and surface water hydrology.

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

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

- Assessment of learning outcomes.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

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.
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.
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.
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.
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.
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.
7. Assignments: Assignments can be used to assess students' understanding of hydrological concepts. Assignments can include problem sets, case studies, and research papers.
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.
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.
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.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
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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 Hydrology - Overview, key concepts and terminology, hydrological cycle, and water balance.
Week 2	Precipitation - Types of precipitation, measurement methods, and spatial and temporal variability.
Week 3	Evapotranspiration - Measurement methods, estimation techniques, and factors affecting evapotranspiration.
Week 4	Infiltration and Soil Water - Infiltration processes, soil water properties, and water movement in soils.
Week 5	Groundwater - Groundwater properties, aquifer types, and groundwater flow.
Week 6	Surface Water Hydrology - Surface water properties, streamflow measurement, and streamflow hydrographs.
Week 7	Hydrologic Routing - Routing methods, hydrologic models, and flood routing.
Week 8	Snow Hydrology - Snow accumulation and melt processes, snow water equivalent, and snowmelt modeling.
Week 9	Water Quality - Water quality parameters, sources of pollution, and water quality modeling.
Week 10	Watershed Hydrology - Watershed characteristics, watershed modeling, and water resources planning.
Week 11	Water Resources Management - Water resources planning and management, water allocation, and water conservation.
Week 12	Climate Change and Hydrology - Impacts of climate change on hydrology, adaptation strategies, and mitigation measures.
Week 13	Hydrological Modeling - Conceptual and physical models, model calibration, and validation.
Week 14	GIS in Hydrology - GIS applications in hydrology - Spatial analysis - Modeling
Week 15	Remote Sensing in Hydrology - Remote sensing data for hydrology, image interpretation, and classification techniques.
Week 16	Review and Assessment - Review of course material - Assessment of learning outcomes.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. "Applied Hydrology" by Ven Chow, David Maidment, and Larry Mays (McGraw Hill Education, 1988) This text provides an introduction to hydrological concepts and covers topics such as precipitation, evapotranspiration, infiltration, and groundwater. 2. "Hydrology and Floodplain Analysis" by Philip B. Bedient, Wayne C. Huber, and Baxter E. Vieux (Pearson, 2013) This text covers topics such as surface water hydrology, watershed modeling, and floodplain analysis. 3. "Groundwater Hydrology" by David Keith Todd and Larry W. Mays (Wiley, 2005) This text provides an in-depth coverage of groundwater hydrology, including groundwater properties, aquifer types, and groundwater flow. 4. "Water Resources Engineering" by Larry W. Mays (Wiley, 2010) This text covers topics such as water resources planning and management, water allocation, and water conservation. 5. "GIS and Geocomputation for Water Resource Science and Engineering" by Barnali Dixon and Venkatesh Uddameri (Wiley, 2016) This text covers the use of GIS in hydrology, including spatial analysis and modeling.	No
Recommended Texts	1. "Introduction to Hydrology" by Warren Viessman Jr. and Gary L. Lewis (Pearson, 2003) This text provides an introduction to hydrological concepts and covers topics such as precipitation, evapotranspiration, infiltration, and groundwater. 2. "Principles of Snow Hydrology" by David R. DeWalle and Albert Rango (Cambridge University Press, 2008) This text covers topics such as snow accumulation and melt processes, snow water equivalent, and snowmelt modeling. 3. "Handbook of Applied Hydrology" edited by Ven Chow (McGraw Hill Education, 1989) This comprehensive text covers a wide range of topics in hydrology, including surface water hydrology, groundwater hydrology, and water quality. 4. "Hydrology: An Introduction" by Wilfried Brutsaert (Cambridge University Press, 2005) This text provides an introduction to hydrological concepts and covers topics such as precipitation, evapotranspiration, infiltration, and groundwater. 5. "Groundwater in Geologic Processes" by Steven M. Gorelick and Richard L. Bras (Cambridge University Press, 2003) This text covers topics related to groundwater geology, including groundwater recharge, subsurface flow, and groundwater-surface water interactions. 6. "Water Resources Systems Planning and Management" by S. P. Simonovic (CRC Press, 2002) This text covers topics related to water resources planning and management, including water allocation, water supply, and water demand management.	No

Websites	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. (https://water.usgs.gov)
	2. National Weather Service - Provides access to weather forecasts, severe weather alerts, and climate data. (https://www.weather.gov)
	3. Global Runoff Data Centre - Provides access to global runoff data, including long-term runoff data and data on extreme events. https://www.bafg.de/GRDC/EN/Home/homepage_node.html
	4. National Oceanic and Atmospheric Administration - Provides access to data on oceanic and atmospheric conditions, including sea surface temperature, ocean currents, and atmospheric circulation. (https://www.noaa.gov)
	5. World Meteorological Organization - Provides access to global weather and climate data, including historical climate data and climate change information. https://public.wmo.int/en
	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. (https://www.usask.ca/hydrology/)
	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. (https://www.hwr.arizona.edu/)

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	Remote Sensing software packages	Module Delivery
Module Type	C	☒ Theory ☒ Lecture ☒ Lab
Module Code	<u>RSGIS24017</u>	

ECTS Credits	<u>4</u>	☐ Tutorial ☐ Practical ☐ Seminar	
SWL (hr/sem)	<u>100</u>		
Module Level	UGII	Semester of Delivery	4
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	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	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. 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. 3. Learn to process and analyze satellite imagery using the software. This includes tasks like image visualization, enhancement, classification, change detection, mosaicing, etc. 4. Understand how to access and download satellite imagery from sources like USGS, Landsat, Copernicus, NASA, etc and prepare the data for analysis. 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. 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. 7. Develop skills to automate repetitive tasks using scripting languages like Python in combination with the software for efficient large scale analysis. 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.
Module Learning Outcomes	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.

مخرجات التعلم للمادة الدراسية	- 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. - 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. - Students will be able to produce thematic maps, land cover maps, probability maps and other geospatial outputs from satellite image analysis using the software. - 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. - Students will be able to automate repetitive tasks in the software using Python or other scripting languages to improve efficiency of large scale analysis. - Students will understand the limitations and strengths of different software packages for specific remote sensing and GIS applications. - Students will develop the ability to interpret and evaluate results from satellite image analysis using remote sensing software packages. 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.
Indicative Contents المحتويات الإرشادية	- Introduction - What is remote sensing? - Types of remote sensing data - Brief history and applications - Overview of software packages - Important Concepts - Image coordinates and projections - Image geometry and anomalies - Spectral bands and indices - Image formats and file types - Software Introduction - Demonstrations of major packages like ERDAS Imagine, ENVI, QGIS, ArcGIS, etc - Interface, tools, functionality of each software - Pros and cons for different applications - Data Access and Preparation - Sources of satellite data - Downloading and preparing data for analysis - Rectification, subsetting, layer stacking, etc. - Image visualization - RGB composite color images - Histogram stretching - Filtering and enhancement techniques - Image Classification - Supervised and unsupervised methods - Accuracy assessment - Thematic map production

	7. Change Detection - Image differencing - Change vector analysis - Post-classification comparison 8. Mapping and Reporting - Producing maps, tables and reports from results - Statistical analysis of geospatial data 9. Automation Using Python/Scripting - Automating repetitive tasks - Handling large volumes of data efficiently 10. Applications - Case studies for land use mapping, crop monitoring, disaster monitoring, urban planning, etc. 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 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	
Strategies	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. 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. 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. 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. 5. Software demonstrations: Demonstrating key functions of the software and giving students hands-on practice during lectures and labs can increase engagement and learning. 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. 7. Discussion forums: Online discussion forums can allow students to ask questions, discuss assignments, and help each other. This promotes collaborative learning. 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.

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.
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.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) 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 Remote Sensing and Software Packages - Overview of remote sensing and its applications - Introduction to different remote sensing software packages - Installation and setup of software packages
Week 2	Image Processing Basics - Image enhancement techniques - Spatial and spectral resolution - Image classification techniques
Week 3	Image Processing with ENVI - Introduction to ENVI software - Importing, viewing, and manipulating images - Spectral analysis and image enhancement in ENVI
Week 4	Image Processing with ArcGIS - Introduction to ArcGIS software - Importing and processing remote sensing data in ArcGIS - Georeferencing and image rectification
Week 5	Image Processing with QGIS

	- Introduction to QGIS software - Importing and processing remote sensing data in QGIS - Creating and editing vector data
Week 6	Radar Remote Sensing with SARscape - Introduction to SAR remote sensing - Overview of SARscape software - Radar image processing, analysis, and interpretation
Week 7	Lidar Remote Sensing with LP360 - Introduction to Lidar remote sensing - Overview of LP360 software - Lidar data processing, analysis, and interpretation
Week 8	Hyperspectral Remote Sensing with ENVI - Introduction to hyperspectral remote sensing - Overview of ENVI software for hyperspectral data analysis - Hyperspectral data processing, analysis, and interpretation
Week 9	: Remote Sensing Data Fusion with ERDAS Imagine - Introduction to data fusion - Overview of ERDAS Imagine software - Image fusion techniques and applications
Week 10	Remote Sensing for Land Use/Land Cover Mapping with eCognition - Introduction to eCognition software - Object-based image analysis for land use/land cover mapping - Feature extraction and classification techniques
Week 11	Remote Sensing for Vegetation Analysis with ENVI - Vegetation indices and their applications - Overview of ENVI software for vegetation analysis - Vegetation mapping and classification techniques
Week 12	Remote Sensing for Water Resources Management with ArcGIS - Overview of ArcGIS software for water resources management - Hydrological modeling using remote sensing data - Flood mapping and analysis
Week 13	Remote Sensing for Climate Change Studies with QGIS - Overview of QGIS software for climate change studies - Remote sensing for climate change impact assessment - Climate change adaptation and mitigation strategies
Week 14	Remote Sensing for Disaster Management with ERDAS Imagine - Overview of ERDAS Imagine software for disaster management - Disaster risk assessment using remote sensing data - Emergency response planning and management
Week 15	Remote Sensing for Urban Planning with eCognition - Overview of eCognition software for urban planning - Object-based image analysis for urban land use and land cover mapping - Urbanization monitoring and management
Week 16	Emerging Trends and Future Directions in Remote Sensing - Overview of emerging trends in remote sensing - Future directions in remote sensing research and development - Discussion of potential applications and impact of remote sensing in various fields.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Introduction to Remote Sensing and Software Packages - Overview of remote sensing and its applications - Introduction to different remote sensing software packages - Installation and setup of software packages Lab Exercises: - Installing and setting up software packages - Exploring the user interface of different software packages
Week 2	: Image Processing Basics - Image enhancement techniques - Spatial and spectral resolution - Image classification techniques Lab Exercises: - Image enhancement using different techniques - Spatial and spectral resolution analysis - Image classification using different techniques
Week 3	Image Processing with ENVI - Introduction to ENVI software - Importing, viewing, and manipulating images - Spectral analysis and image enhancement in ENVI Lab Exercises: - Importing and viewing images in ENVI - Spectral analysis and image enhancement using ENVI tools
Week 4	Image Processing with ArcGIS - Introduction to ArcGIS software - Importing and processing remote sensing data in ArcGIS - Georeferencing and image rectification Lab Exercises: - Importing and processing remote sensing data in ArcGIS - Georeferencing and image rectification using ArcGIS tools
Week 5	: Image Processing with QGIS - Introduction to QGIS software - Importing and processing remote sensing data in QGIS - Creating and editing vector data Lab Exercises: - Importing and processing remote sensing data in QGIS - Creating and editing vector data using QGIS tools
Week 6	Radar Remote Sensing with SARscape - Introduction to SAR remote sensing - Overview of SARscape software - Radar image processing, analysis, and interpretation Lab Exercises: - Importing and processing radar images in SARscape - Radar image processing, analysis, and interpretation using SARscape tools
Week 7	Radar Remote Sensing with SARscape

	- Introduction to SAR remote sensing - Overview of SARscape software - Radar image processing, analysis, and interpretation Lab Exercises: - Importing and processing radar images in SARscape - Radar image processing, analysis, and interpretation using SARscape tools
Week 8	Hyperspectral Remote Sensing with ENVI - Introduction to hyperspectral remote sensing - Overview of ENVI software for hyperspectral data analysis - Hyperspectral data processing, analysis, and interpretation Lab Exercises: - Importing and processing hyperspectral data in ENVI - Hyperspectral data processing, analysis, and interpretation using ENVI tools
Week 9	: Remote Sensing Data Fusion with ERDAS Imagine - Introduction to data fusion - Overview of ERDAS Imagine software - Image fusion techniques and applications Lab Exercises: - Image fusion using ERDAS Imagine tools - Image classification using fused images
Week 10	Remote Sensing for Land Use/Land Cover Mapping with eCognition - Introduction to eCognition software - Object-based image analysis for land use/land cover mapping - Feature extraction and classification techniques Lab Exercises: - Object-based image analysis using eCognition tools - Feature extraction and classification using eCognition tools
Week 11	Remote Sensing for Vegetation Analysis with ENVI - Vegetation indices and their applications - Overview of ENVI software for vegetation analysis - Vegetation mapping and classification techniques Lab Exercises: - Vegetation index calculation and analysis using ENVI tools - Vegetation mapping and classification using ENVI tools
Week 12	Remote Sensing for Water Resources Management with ArcGIS - Overview of ArcGIS software for water resources management - Hydrological modeling using remote sensing data - Flood mapping and analysis Lab Exercises: - Hydrological modeling using ArcGIS tools - Flood mapping and analysis using ArcGIS tools
Week 13	Remote Sensing for Climate Change Studies with QGIS - Overview of QGIS software for climate change studies - Remote sensing for climate change impact assessment - Climate change adaptation and mitigation strategies
169	

Required Texts	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. 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. 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. 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. 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.	No
Recommended Texts	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. 2. ERDAS Field Guide by ERDAS Inc. - A hands-on guide to using ERDAS Imagine software for remote sensing applications. 3. QGIS Map Design by Anita Graser - A practical approach to learning QGIS mapping software for GIS professionals and students.	No

- Software package websites:
 - ERDAS Imagine: <https://hexagongeospatial.com/products/produits/erdas-imagine>
Provides tutorials, documentation and learning resources for ERDAS Imagine.
 - ENVI: <https://www.harrisgeospatial.com/Software-Technology/ENVI.aspx>
Contains user guides, tutorials and a knowledge base for ENVI software.
 - QGIS: <https://www.qgistutorials.com/>
An excellent resource with free video tutorials and training materials for QGIS.
 - ArcGIS: <https://www.esri.com/training/>
ESRI's training portal has free and paid courses, tutorials and lessons for ArcGIS.
- Data sources:
 - USGS Earth Explorer: <https://earthexplorer.usgs.gov/>
Access to a wide variety of satellite imagery from USGS.
 - Copernicus Open Access Hub: <https://scihub.copernicus.eu/>
Download Sentinel satellite imagery for free from the European Space Agency.
- Useful tutorials and resources:
 - GIS Geography: <https://gisgeography.com/category/remote-sensing>
Tutorials and articles on remote sensing and GIS topics.
 - GIS Lounge: <https://www.gislounge.com/category/remote-sensing/>
GIS and remote sensing blog with how-to guides, news and resources.
 - NASA Remote Sensing Tutorials: <https://train.org/nasatutorial/satimage/satimage.html>
Step-by-step guides from NASA on analyzing satellite imagery.
- Journal databases:
 - MDPI Remote Sensing: <https://www.mdpi.com/journal/remotesensing>
Open access journal with current research in remote sensing and GIS.
 - IEEE Geoscience and Remote Sensing: <https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=368>
Peer-reviewed journal publishing advances in the field.

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	Numerical Analysis			Module Delivery	
Module Type	B			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	RSGIS24018				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGII	Semester of Delivery		4
Administering Department			College		
Module Leader	هالة قحطان حمدي		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		10/3/2026	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

Module Objectives أهداف المادة الدراسية	1. Having the knowledge of the ways to solve some problems in numerical ways using computers. 2. Having the knowledge of how to find the derivatives and integrations using numerical methods. 3. Having the knowledge of how to solve matrix with large dimensions. 4. Having the ability of interpolation to functions and how to find a function if we know only some points. 5. Using numerical methods to solve integrations which have no known solutions. 6. Solving some problems - making some research in Libraries and using internet.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Solving some problems in numerical ways using computers. 2. Finding the derivatives and integrations using numerical methods. 3. Solving matrix with large dimensions. 4. Making interpolation to functions and how to find a function if we know only some points. 5. Solving integrations which have no known solutions-making. 6. Search in Libraries and using internet.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Numerical errors • Root finding for functions of one variable • Root finding for functions of several variables

- Solving linear equation systems
- Interpolation by polynomials
- Numerical integration
- Numerical differentiation
- Initial value problems for ordinary differential equations
- Boundary value problems for ordinary differential equations

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 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 للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)

الحمل الدراسي المنتظم للطلاب خلال الفصل

Structured SWL (h/w)

الحمل الدراسي المنتظم للطلاب أسبوعيا

Unstructured SWL (h/sem)

الحمل الدراسي غير المنتظم للطلاب خلال الفصل

Unstructured SWL (h/w)

الحمل الدراسي غير المنتظم للطلاب أسبوعيا

Total SWL (h/sem)

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	6	10% (10)	2,3,6,8,10 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	Basic concepts: round-off errors, floating point arithmetic, Convergence.
Week 2	Numerical solution of Nonlinear Equations, Root Finding (Solving Transcending Equations) Bisection method, Steps Algorithm, Examples with Some Properties.
Week 3	Numerical solution of Nonlinear Equations, Root Finding (Solving Transcending Equations) Newton's method Steps Algorithm, Examples with Some Properties
Week 4	Secant Method Steps Algorithm, Examples with Some Properties.

Week 5	false position Method Steps Algorithm, Examples with Some Properties.
Week 6	Fixed Point Method Steps Algorithm, Examples with Some Properties.
Week 7	Mid-term Exam
Week 8	System of Linear Equations : Vectors, Matrices, Linear Equations, zero matrix, identity matrix, with examples.
Week 9	System of Linear Equations : Matrix Arithmetic Operations, Determinant of a MATRICES, adding and Multiplying Matrices, with examples.
Week 10	Types of matrices, symmetric matrix and upper/lower triangle matrix, Augmented Matrix with examples.
Week 11	Method of Elimination: Standard and Matrix form, number of solutions, one, infinite, no solutions, Operations That Produce Equivalent Systems with examples.
Week 12	Gaussian Elimination: Forward Elimination with examples.
Week 13	Gaussian Elimination: Backward Substitution with examples.
Week 14	Gauss-Jordon Method: Solve system of equations by using G-J method with examples.
Week 15	Review.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Preliminaries of Computing with MatLab.
Week 2	Learning the statements (words used in programming)
Week 3	Bisection method Steps Algorithm, Examples with Some Properties in MatLab
Week 4	Newton's method Steps Algorithm, Examples with Some Properties in MatLab
Week 5	Secant Method Steps Algorithm, Examples with Some Properties in MatLab.
Week 6	false position Method Steps Algorithm, Examples with Some Properties in MatLab.
Week 7	Mid-term Exam
Week 8	Fixed Point Method Steps Algorithm, Examples with Some Properties in MatLab.
Week 9	Vectors, Matrices, Linear Equations, zero matrix, identity matrix, with examples in MatLab.
Week 10	Determinant of a MATRICES, adding and Multiplying Matrices, with examples in MatLab.
Week 11	Types of matrices, symmetric matrix and upper/lower triangle matrix, Augmented Matrix with examples in MatLab.
Week 12	Standard and Matrix form, number of solutions, one, infinite, no solutions, Operations That Produce Equivalent Systems with examples in MatLab.
Week 13	Gaussian Elimination: Forward Elimination with examples in MatLab.
Week 14	Gaussian Elimination: Backward Substitution. with examples in MatLab.
Week 15	Review.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

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

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	Arabic Language II			Module Delivery	
Module Type	<u>C</u>			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	<u>UOB201</u>				
ECTS Credits	<u>2</u>				
SWL (hr/sem)	<u>50</u>				
Module Level		UGII	Semester of Delivery		
Administering Department		Type Dept. Code	College	Type College Code	
Module Leader	Leqaa faleh owdaa flaih		e-mail	leqaa.falih@ircoedu.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		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 أهداف المادة الدراسية	التعريف بقواعد اللغة العربية
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	لغة عربية سليمة بقواعد وشعر وأدب عربي
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) 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 الأسبوعي 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 الممتنبي.
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
Success Group (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 (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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Module Information

معلومات المادة الدراسية

Module Title	English Language II	Module Delivery
Module Type	<u>B</u>	☒ Theory

Module Code	UOB202		☒ Lecture ☐ Tutorial ☐ Practical ☐ Seminar	
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	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				
Module Objectives أهداف المادة الدراسية	a pre-intermediate level course aiming to build and further improve language proficiency for second year students/ college of science, 1. Listening Objectives: - Understand and respond appropriately to a variety of spoken English in familiar contexts. - Comprehend main ideas, specific details, and implied information in spoken texts. - Develop listening strategies to enhance understanding. 2. Speaking Objectives: - Engage in conversations on a range of topics using appropriate vocabulary and grammar. - Express opinions, preferences, and experiences. - Develop speaking strategies for effective communication, such as turn-taking and seeking clarification. 3. Reading Objectives: - Read and understand a variety of texts, including articles, stories, and informational passages. - Comprehend main ideas, details, and implied information in written texts. - Develop reading strategies for comprehension and vocabulary acquisition. 4. Writing Objectives: - Write coherent paragraphs and short texts on different topics. - Express ideas clearly and logically using appropriate grammar and vocabulary. - Develop writing strategies for organization, coherence, and accuracy. 5. Grammar and Vocabulary Objectives: - Develop a solid understanding and usage of a wide range of grammatical structures appropriate for the pre-intermediate level.			

	• Expand vocabulary knowledge to include a broader range of words, idiomatic expressions, and collocations. • Apply grammar and vocabulary knowledge to express oneself accurately and effectively. 6. Pronunciation and Intonation Objectives: • Improve pronunciation accuracy of individual sounds, stress patterns, and intonation. • Use appropriate rhythm, stress, and intonation for effective communication. • Recognize and produce connected speech features to enhance fluency and naturalness. 7. Cultural Awareness Objectives: • Develop an understanding of cultural practices, customs, and social norms in English-speaking countries. • Demonstrate cultural sensitivity and adapt communication accordingly. • Recognize the impact of culture on language use and communication styles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Learner training is essential to the achievement of the Learning Outcomes. 1. Listening and Speaking: • Understand and respond appropriately to a range of everyday spoken English in familiar contexts. • Engage in conversations and discussions on a variety of topics using appropriate language and strategies. • Comprehend and extract information from spoken texts, such as interviews, dialogues, and narratives. 2. Reading: • Read and understand a variety of texts, including articles, stories, and informational passages. • Comprehend main ideas, details, and specific information from the texts. • Apply reading strategies to infer meaning from context and make predictions. 3. Writing: • Write coherent and well-organized paragraphs and short texts on various topics. • Express ideas and opinions clearly and concisely. • Demonstrate control of grammar, vocabulary, and sentence structures appropriate for the pre-intermediate level. 4. Grammar and Vocabulary: • Understand and use a wide range of grammatical structures and tenses, including present perfect, past simple, future forms, and conditionals. • Expand vocabulary knowledge to include a broader range of words, idiomatic expressions, and collocations. • Apply grammar and vocabulary in context to enhance communication skills. 5. Pronunciation and Intonation: • Develop accurate pronunciation of individual sounds and common word stress patterns. • Use appropriate intonation and stress patterns to convey meaning effectively. • Understand and produce connected speech features, such as linking sounds and contractions. 6. Cultural Awareness:

	• Gain insights into cultural practices, traditions, and customs in English-speaking countries. • Develop intercultural competence and sensitivity in communication. • Understand cultural influences on language use and behavior.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1: Greetings and Introductions • Vocabulary: Greetings, introductions, personal information • Grammar: Present simple, present continuous, subject pronouns, possessive adjectives • Skills: Listening to and giving personal information, role-playing introductions, writing short personal profiles 2: Daily Routines • Vocabulary: Daily activities, time expressions • Grammar: Present simple, adverbs of frequency, prepositions of time • Skills: Talking about daily routines, describing habits and schedules, writing a daily routine diary 3: Family and Relationships • Vocabulary: Family members, relationships, adjectives to describe people • Grammar: Possessive 's, can/can't, imperatives • Skills: Talking about family members, describing people's appearance and personality, writing about a family member 4: Free Time and Hobbies • Vocabulary: Leisure activities, hobbies, sports • Grammar: Present simple vs. present continuous, question words • Skills: Discussing leisure activities, talking about hobbies and interests, writing about favorite pastimes 5: Shopping and Money • Vocabulary: Shops, money, prices, clothes • Grammar: Countable and uncountable nouns, plurals, quantifiers • Skills: Role-playing shopping conversations, describing clothes, writing a shopping list 6: Travel and Transportation • Vocabulary: Means of transport, travel destinations, directions • Grammar: Present perfect, past simple, adverbs of time • Skills: Discussing travel experiences, giving and following directions, writing about a memorable trip 7: Food and Eating Habits • Vocabulary: Food items, meals, cooking, restaurants • Grammar: Countable and uncountable nouns, articles, some/any • Skills: Talking about food preferences, ordering in a restaurant, writing a recipe 8: Health and Well-being • Vocabulary: Health issues, symptoms, remedies • Grammar: Should/shouldn't, modals for advice and obligation • Skills: Discussing health problems, giving advice, writing a health blog post 9: Jobs and Careers • Vocabulary: Professions, job descriptions, skills • Grammar: Past continuous, comparatives and superlatives • Skills: Talking about jobs and career aspirations, describing job experiences, writing a resume 10: Future Plans and Ambitions • Vocabulary: Future forms (will, going to, present continuous), ambitions, goals • Grammar: Future forms, time clauses • Skills: Discussing future plans, setting goals, writing a letter to your future self 11: Technology and Communication • Vocabulary: Communication devices, social media, technology-related terms • Grammar: Present perfect continuous, future continuous, indirect questions • Skills: Discussing technology and its impact, describing communication habits, writing an email or text message 12: Environment and Sustainability • Vocabulary: Environmental issues, natural disasters, conservation • Grammar: Conditional sentences, passive voice

	Skills: Discussing environmental concerns, expressing opinions on sustainability, writing an article on environmental conservation
	13: Culture and Traditions - Vocabulary: Festivals, customs, cultural practices - Grammar: Reported speech, relative clauses - Skills: Talking about cultural events, comparing traditions, writing a description of a cultural celebration
	14: Education and Learning - Vocabulary: School subjects, learning methods, educational institutions - Grammar: Past perfect, modals for possibility and certainty - Skills: Discussing educational experiences, describing favorite subjects, writing an opinion essay on the benefits of education
	15: Travel and Tourism - Vocabulary: Tourist attractions, accommodation, travel experiences - Grammar: Comparative and superlative adjectives, phrasal verbs - Skills: Talking about travel preferences, recommending destinations, writing a travel blog post or itinerary

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	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. 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. 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. 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. 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. 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. 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. 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. 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. 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. 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. 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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	109	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعياً	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	91	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعياً	6
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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 الأسبوعي النظري

	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	Getting to know you p6 Tenses Present, past, future p6 Questions Where were you born? What do you do? p6 Question words Who ...?, Why ...?, How much ...? p7 Right word, wrong word Verbs of similar meaning speak/talk, say/tell Adjectives and nouns that go together Prepositions to, from, at, about, of, on, in, etc. Words with two meanings I met my husband on a blind date. Dates are good for you. p12 Social expressions Have a good weekend! Same to you. p13
Week 2	Whatever makes you happy p14 Present tenses Present Simple She lives alone in Bristol. p14

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

	your coffee? This is delicious! p37
Week 5	Looking forward p38 Verb patterns want/hope to do like/enjoy doing looking forward to doing 'd like to p38 Future forms going to, will and Present Continuous I'm going to stay with a friend. I'll call or text you. I'm working late this evening. p40 Phrasal verbs – literal move back take away grow up p44 Phrasal verbs – idiomatic give up take off look after p44 Expressing doubt and certainty Of course he will. He might do. Mmm ... maybe. I doubt it. No chance. p45
Week 6	The way I see it p46 What ... like? What's your teacher like? p46 Comparative and superlative adjectives big, bigger, biggest good, better, best p47 as ... as It isn't as hot as Dubai. p47 Relative pronouns who/that/which/where p110 Synonyms and antonyms lovely, beautiful brilliant, terrible p52 What's on? How much is it to go in the museum? Is it open on Sunday? What film is suitable for children? p53
Week 7	Mid-term Exam
Week 8	Living history p54 Present Perfect John has lived there for three years. p55 for and since for two hours since six o'clock p55 ever and never Have you ever been ...? I've never been to South America. p56

	Present Perfect or Past Simple Have you had an ordinary job? I worked in a restaurant. p57 Word endings Jobs philosopher, historian, economist p57 Nouns and adjectives competition, famous p57 Word stress danger, dangerous invite, invitation p57 Agree with me! It's wonderful, isn't it? You come from Scotland, don't you? It wasn't easy, was it? You've lived here for years, haven't you? p61
Week 9	Girls and boys p62 have to She has to train hard. I don't have to train every day. Do you have to work at weekends? p63 should You should show him this letter. p64 must He must get professional help. p64 Things to wear belt, cap, boots, jumper, make-up p68 Materials leather, wool, denim, cotton p68 Situations job interview, party, beach holiday p68 At the doctor's a sore throat, flu, food poisoning I've got a fever. My body aches. My glands are swollen. p69
Week 10	Time for a story p70 Past Perfect They had walked twenty miles. p71 Narrative tenses They saw a bear. They were looking for work. p71 Joining sentences although, because when, while, before, after, as, until, as soon as p72 Feelings angry, nervous, delighted,

	stressed p76 Exclamations with so and such I was so scared! It was such a shock! We had such terrible weather! I've got so much work! p77
Week 11	Our interactive world p78 Passives Mobile phones are used by almost 6 billion people. The first mobile phone call was made in 1973. Camera phones have been sold since 2002. Landline telephones will be replaced by mobile phones. p79 Words that go together Noun + noun text message, businessman p81 Verb + noun take notes, send a text message p81 Adverb + adjective well-known, badly-behaved p81 On the phone 07700 900333 Can I speak to Patrick, please? I'm calling because ... Sorry, you're breaking up ... p85
Week 12	Life's what you make it! p86 Present Perfect Continuous He's been making programmes since 2007. How long has she been working there? p87 Present Perfect Simple versus Continuous He's made three programmes. He's been teaching for three years. p87 Birth, marriage, death pregnant, born engaged, divorced funeral, died of p92 Good news, bad news Congratulations! That's fantastic news! What a shame! I'm so sorry. p93
Week 13	Just wondering ...

	p94 First conditional if + will If it's sunny, we'll go for a picnic. We won't go out if it rains. p95 going to and might What are you going to do tonight? I might go out ... p95 Second conditional if + would If I had a brother, I'd play with him. If I were you, I'd stop smoking. p96 Prepositions connected to on a date listen to think about p100 Thank you and goodbye! It's late. I must be going now. Thank you for a lovely evening. My pleasure! p101
Week 14	Living in a stately home Living history Chatsworth House and the family who call it home p58 A family history David Taylor Bews from Perth, Australia researches his family history p60 What do you think? Stately homes Aristocracy Inherited wealth p58 Talking about you Have you ever ...? p57 The lives of your grandparents p60 What do you think? Family history p60 A biography Ordering paragraphs: Two Kennedys Researching facts about a famous person and writing a biography p111
Week 15	Families with all boys or all girls Sons and daughters The parents of four daughters swap homes with the parents of four sons p66 Heptathlon champion An interview with Jessica Ennis – Britain's first world heptathlon champion p65 What do you think? Talking about successful people p65

	Pros and cons of all-girl or all-boy families The ideal family p66 Dress person X Describing an outfit p68 Letters and emails Formal and informal expressions Dear Sir or Madam, Yours sincerely, Hi Cathy, Love Steve Writing a formal letter to a language school and an email to an English friend p112
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	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
Recommended Texts	New Headway Plus provides an integrated skills course with each unit divided into grammar, vocabulary, skills work and everyday English segments	No
Websites	Oxford University Press: The New Headway series is published by Oxford University Press. Visit their website at www.oup.com 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
Success Group (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 (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 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		☒ Theory
Module Code	RSGIS11001		☒ Lecture
ECTS Credits	8		☒ Lab
SWL (hr/sem)	200		☐ Tutorial
			☐ Practical
			☐ Seminar
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 Reem Shihab Hameed Tabarak Sami Hashesh	e-mail	Abeer.n@sc.uobaghdad.edu.iq reem.hameed1204@sc.uobaghdad.edu.iq Tabarak.Sami@sc.uobaghdad.edu.iq
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	
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Co-requisites module	None	Semester	
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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	By the end of this course, students will: - Understand the basic concepts of remote sensing including electromagnetic spectrum, platforms, sensors and image interpretation techniques. - Learn the principles of photogrammetry and stereoscopic viewing of aerial imagery. - Be able to perform essential image processing tasks such as radiometric and geometric correction, filtering, and supervised and unsupervised image classification. - Gain practical skills in using remote sensing techniques for land cover mapping, monitoring vegetation and detecting environmental changes. - Be able to evaluate the suitability of available remote sensing data and techniques for various real-world applications. - Develop hands-on experience in analyzing remote sensing images using software tools for information extraction and problem-solving. - Be exposed to communication skills through assignments, projects and presentations involving remote sensing concepts. - Gain experience in teamwork by collaborating with peers on assignments and projects utilizing remote sensing data and techniques. - Develop an overall perspective on the role, potential and limitations of remote sensing for environmental monitoring and resource management. 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Describe the basic concepts and terminology of remote sensing including electromagnetic spectrum, platforms, sensor systems and image interpretation techniques. - Explain the principles of photogrammetry and the geometry of aerial imagery. Extract features and measurements from images. - Perform essential image processing tasks such as radiometric and geometric correction, image enhancement and image classification. - Apply remote sensing techniques to map land cover and land use, monitor vegetation and detect environmental changes. - Critically evaluate the suitability of remote sensing data and methods for different applications. Identify limitations and sources of error. - Interpret and analyze remotely sensed images using appropriate software to extract information and solve problems. - Communicate technical concepts related to remote sensing in oral and written form. - Work collaboratively in a team to complete assignments and projects involving remote sensing data and techniques.

Indicative Contents المحتويات الإرشادية	1. Introduction to Remote Sensing - Definition of remote sensing - Electromagnetic spectrum and spectral bands used in remote sensing - Active and passive remote sensing systems - Types of remote sensing platforms (satellites, aircrafts, UAVs) 2. Sensor Systems and Image Interpretation - Sensor characteristics (spatial, temporal and spectral resolution) - Data formats (raster, vector) - Image interpretation techniques (visual, digital) 3. Photogrammetry - Principles of aerial photography - Film-based and digital imaging sensors - Stereoscopic viewing and imaging geometry - Image measurements and feature extraction 4. Image Processing - Image preprocessing (radiometric and geometric correction) - Image enhancement techniques (contrast stretch, filtering) - Image classification (supervised and unsupervised) 5. Applications of Remote Sensing - Land use/cover mapping - Vegetation monitoring - Urban studies - Natural hazard monitoring
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	a. Lectures - Use lectures to introduce and explain the key concepts and topics. Keep lectures interactive with questions, examples and discussions. b. Demonstrations - Demonstrate hands-on how to perform image processing and analysis tasks using software tools. This helps students visualize and apply the concepts. c. Assignments - Give students assignments to apply what they learn to real data and scenarios. This could include image processing, classification and interpretation tasks. 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.
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- e. Labs - Incorporate dedicated lab sessions where students work on assignments and projects using software tools under supervision. Clarify doubts and provide feedback.
- f. Discussions - Hold group and class discussions to elicit student questions, clarify concepts and reason through complex problems.
- g. Guest lectures - Invite experts and practitioners from industry to give real-world perspective on remote sensing applications.
- h. Case studies - Use case studies of actual remote sensing projects to illustrate applications and limitations of techniques.
- i. Field trips - Organize field trips where possible for students to see and collect remote sensing data using ground sensors for comparison.
- j. Visual aids - Use illustrations, diagrams, videos and remote sensing images to enhance learning and understanding.
- 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.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) 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
	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)		
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Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	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.
Week 2	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
Week 3	1. Energy interactions in the atmosphere, 2. Composition of the atmosphere 3. Energy interaction, 4. Scattering, 5. Types of scattering, 6. Absorption.
Week 4	1. Energy interactions with earth surface features, 2. Reflection, 3. Diffuse and Specular Reflection, 4. Spectral Reflectance Curves, 5. Transmission.
Week 5	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.
Week 6	1. Satellites and orbits, 2. Characteristics of satellite orbits, 3. Geosynchronous orbit, 4. Polar orbit, 5. Sun- synchronous orbit.
Week 7	Review + Mid-term Exam
Week 8	1. Resolutions, 2. Spatial Resolution, 3. Spectral Resolution, 4. Radiometric Resolution, 5. Temporal Resolution.
Week 9	1. MULTISPECTRAL REMOTE SENSING, 2. MULTISPECTRAL Scanners 3. Across- track scanning, 4. Example, 5. Along- track scanning, 6. Thematic Mapper.
Week 10	1. THERMAL REMOTE SENSING, 2. Thermal scanner, 3. Principle involved in the Thermal sensing, 4. Thermal imaging.
Week 11	1. HYPERSPECTRAL REMOTE SENSING, 2. Hyperspectral sensors, 3. Examples.
Week 12	1. FEATURES OF THE REMOTE SENSING SATELLITES, 2 Landsat satellite program 3. Spot satellite program, 4. IRS satellite program
Week 13	1- Correction of Remote sensing data, 2. Geometric correction 3. Radiometric correction
Week 14	1. Ground Truth Collection, 2. Visual Interpretation, 3. Digital and analog methods of Image Interpretation Correction of Remote sensing data 1- Geometric correction 2- Radiometric correction

	عرض المحاضرة من عرض و شرح المحاضرة حضوريا في القاعة الدراسي لامتحانات التحريرية والشفهية والواجبات البيتية
Week 15	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)
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	How to download satellite images
Week 2	Introduction of ERDAS IMAGINE 2014 and tools
Week 3	How to open satellite images using ERDAS IMAGINE 2014
Week 4	Learn how to import and export images to ERDAS IMAGINE 2014
Week 5	Measurement using measuring tools for length, area, and dimension
Week 6	Pre-processing Raster Data -Image correction - Composite bands
Week 7	Review + Mid-term Exam
Week 8	Pre-processing Raster Data -Image correction - Composite bands
Week 9	Spatial Data - Raster Data - Metadata
Week 10	Pre-processing Raster Data -Clipping - Mosaic
Week 11	Image Processing Classification Unsupervised Classification
Week 12	Image Processing

	Classification Supervised Classification
Week 13	Environmental management applications - 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	https://www.coursera.org/browse/Remote Sensing	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	☒ Theory
Module Code	RSGIS11002	☒ Lecture
ECTS Credits	2	☐ Tutorial
SWL (hr/sem)	50	☐ Practical
		☐ Seminar

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	إ.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

Module Objectives أهداف المادة الدراسية	Here are some learning objectives for a course on digital image processing: 1.To understand the sensing, acquisition and storage of digital images. 2.To study the image fundamentals and mathematical transforms necessary for image processing. 3.To understand the digital processing systems and corresponding terminology. 4.To understand the base image transformation domains and methods. 5.To have an understanding of colour models, type of image representations and related statistics.
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	6.To study the image enhancement techniques. 7.To study image restoration. 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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing a course on digital image processing , students should be able to: 1.Have a clear understanding of the principals the Digital Image Processing terminology used to describe features of images. 2.Have a good understanding of the mathematical foundations for digital manipulation of images; image acquisition; preprocessing; Fourier domain processing. 3.Be able to write programs using Matlab language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression. 4.Have knowledge of the Digital Image Processing Systems. 5.Be able to understand the documentation for, and make use of, the MATLAB library and MATLAB Digital Image Processing Toolbox (IPT). 6.Learn and understand the Image Enhancement in the Spatial Domain. 7.Learn and understand the Image Enhancement in the Frequency Domain. 8. Understand the Image Restoration, Representation and Description. Finally, The students would get a firm foundation in 2-D image processing and be able to handle real-world image processing problems.
Indicative Contents المحتويات الإرشادية	Here are some indicative contents that may be covered in a course on digital image processing : 1.Image sources and generation 2.Image sampling and quantization 3.Same basic relationship between pixels 4.Intensity transformations and spatial filtering background. 5.Some Basic Intensity Transformation Functions 6.Histogram Processing 7.Fundamentals of Spatial Filtering 8.Smoothing Spatial Filters 9.Sharpening Spatial Filters 10.Combining Spatial Enhancement Methods 11.The Discrete Fourier Transform (DFT) of one Variable 12.Extension to Functions of Two Variables

	13. Some Properties of the 2-D Discrete Fourier Transform 14. The Basics of Filtering in the Frequency Domain 15. Image Smoothing Using Frequency Domain Filters 16. Image Sharpening Using Frequency Domain Filters 17. Basic Image Restoration techniques
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
	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. 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. 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. 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. 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. 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. 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. 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. 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. 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.
199	

	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. 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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) 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

	Material Covered
Week 1	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
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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 www.oup.com and search for "New Headway Plus, Special Edition, Beginner Level " or browse their English language teaching section for information on the course.	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ 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					
Module Objectives أهداف المادة الدراسية	7. To develop problem solving skills and understanding of general physics through the application of techniques. 8. To understand motion laws, velocity and acceleration from. 9. This course deals with the basic concept of energy 10. This is the basic subject for all types of force. 11. To understand three newton's laws and electromagnetic problems. 12. To perform Maxwell's equation and its applications.				
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Apply fundamental physics principles to solve quantitative and qualitative problems in mechanics, thermodynamics, electromagnetism, optics and modern physics. • Perform experiments using laboratory equipment to verify physical theories, measure fundamental constants and analyze experimental uncertainties and sources of error. • Interpret physics concepts through mathematical formulation and use equations to model real-world physical systems. • Recognize the role of evidence, assumptions, logic and subjectivity in developing and evaluating scientific theories. • Explain physics concepts and justify solutions clearly and precisely using appropriate terminology in speech and writing. • Evaluate the limitations and practical applications of physics in various domains of science and technology.				

	• Work productively with others to carry out experimental procedures, analyze data and develop group solutions to problems. • Demonstrate a capacity for independent inquiry, critical thinking and self-directed learning in studying physics. • Develop an appreciation for the thought processes, evidence and creativity involved in the scientific enterprise. 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. The outcomes listed above reflect abilities in several domains by the end of the physics course: 1. Application of conceptual knowledge 2. Experimental and practical skills 3. Mathematical and quantitative problem-solving skills 4. Critical thinking and perspective 5. Communication skills 13. Collaboration and teamwork 14. Independent learning and inquiry 15. Attitudes towards physics and the scientific process 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.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Introduction to physics: One-dimensional motion</u> <u>Displacement, velocity, and time: One-dimensional motion</u> <u>Acceleration: One-dimensional motion</u> <u>Kinematic formulas and projectile motion: One-dimensional motion</u> <u>Old videos on projectile motion</u> Revision problem classes [6 hrs] <u>Newton's laws of motion: Forces and Newton's laws of motion</u> <u>Normal force and contact force: Forces and Newton's laws of motion</u> <u>Balanced and unbalanced forces: Forces and Newton's laws of motion</u> <u>Forces and Newton's laws of motion</u> <u>Inclined planes and friction: Forces and Newton's laws of motion</u> <u>Tension: Forces and Newton's laws of motion</u> <u>Treating systems</u> <u>introduction to electromagnetic waves: Electromagnetic waves and interference</u> <u>Interference 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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) 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
	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 - Introduction to physics, motion laws,-Motion in 2D Projectile 1D
Week 2	Force and motion, Types of forces
Week 3	Review of Applications of forces Gravitational forces, Centripetal force
Week 4	Review of Work , Energy ,Types of energy, Laws of conservation of energy ,and applications

	POWER and relation with energy	
Week 5	Review Momentum ,Linear momentum, Conservation of momentum	
Week 6	Review of Collision -elastic –inelastic 2D collision	
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit	
Week 8	Review of Center of mass	
Week 9	Waves ,Waves types ,Waves parameters, Hooks law	
Week 10	Quantities ,Vectors ,Scalars, Vector addition ,Subtraction ,Vector product ,Scalar product	
Week 11	Triple product ,Divergence ,Curl ,Laplace	
Week 12	principles of electromagnetic theory Maxwell's equations, differential form Integral form	
Week 13	Electromagnetic spectrum, radio stations ,antenna	
Week 14	Energy current density, Poynting vector ,Electric field energy density,Magnetic field energy density	
Week 15	Electromagnetic spectrum, Regions ,Wavelengths ,Applications	
Week 16	Preparatory week before the final Exam	
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر		
	Material Covered	
Week 1	Lab 1: Introduction to mechanics	
Week 2	Lab 2: simple pendulum	
Week 3	Lab 3: diffraction grating	
Week 4	Lab 4: Flywheel	
Week 5	Lab 5: surface tension	
Week 6	Lab 6: refractive index	
Week 7	Lab 7: sound velocity	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Introductory Physics: - "University Physics" by Young and Freedman - "Physics for Scientists and Engineers" by Giancoli - "Fundamentals of Physics" by Halliday, Resnick, and Walker	Yes

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	2. Classical Mechanics: - "Classical Mechanics" by Herbert Goldstein - "Classical Dynamics of Particles and Systems" by Thornton and Marion - "Introduction to Classical Mechanics" by David Morin 3. Electromagnetism: - "Introduction to Electrodynamics" by David Griffiths - "Electricity and Magnetism" by Edward Purcell - "Classical Electrodynamics" by Jackson 4. Quantum Mechanics: - "Principles of Quantum Mechanics" by Shankar - "Modern Quantum Mechanics" by Sakurai - "Quantum Mechanics Concepts and Applications" by Nouredine Zettili 5. Statistical Mechanics: - "An Introduction to Thermal Physics" by Daniel Schroeder - "Statistical Mechanics: Entropy, Order Parameters, and Complexity" by James Sethna - "Statistical Mechanics" by Pathria and Beale Schaum outlines(book). 2003.vol2	
Recommended Texts	1. Introductory Physics: - "Concepts of Physics" by H.C. Verma - "The Feynman Lectures on Physics" by Richard Feynman - "Physics for Scientists and Engineers with Modern Physics" by Tipler and Mosca 2. Classical Mechanics: - "Classical Mechanics" by Taylor - "Classical Mechanics" by Thornton and Marion - "Analytical Mechanics" by Fowles and Cassiday 3. Electromagnetism: - "Introduction to Electrodynamics" by David Griffiths - "Electricity and Magnetism" by Edward Purcell - "Electromagnetic Fields" by Wangsness 4. Quantum Mechanics: - "Principles of Quantum Mechanics" by Shankar - "Modern Quantum Mechanics" by Sakurai - "Quantum Mechanics and Path Integrals" by Feynman and Hibbs 5. Statistical Mechanics: - "Thermal Physics" by Kittel and Kroemer - "Statistical Physics of Particles" by Mehran Kardar - "Introduction to Modern Statistical Mechanics" by David Chandler	yes
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	Electromagnetic theory (book). 2000.vol.1			
Websites	1. Khan Academy (https://www.khanacademy.org/science/physics) - 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. 2. MIT OpenCourseWare (https://ocw.mit.edu/courses/physics/) - 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. 3. Physics Classroom (https://www.physicsclassroom.com/) - 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. 4. HyperPhysics (http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html) - 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. 5. Physlet Physics (https://www.compadre.org/Physlets/) - 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. 6. Wolfram Physics Project (https://www.wolframphysics.org/) - The Wolfram Physics Project is a new approach to understanding the fundamental laws of physics. The website			
Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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	☑ Theory
Module Code	RSGIS11004	

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ECTS Credits	6		☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
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	
Co-requisites module	None		Semester	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية				
Module Objectives أهداف المادة الدراسية	1. Use functions and other pre-Calculus mathematics proficiently. 2. Calculate, use, and explain the concept of limits. 3. Explain and interpret the meaning of the derivative of a function. 4. Use shortcuts to calculate derivatives efficiently. 5. Use derivatives to solve authentic real-life application problems. 6. Use definite integrals and the Fundamental Theorem of Calculus to find areas and total change.			
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	7. Determine the existence of, estimate numerically and graphically, and find algebraically the limits of functions. 8. Recognize and determine infinite limits and limits at infinity and interpret with respect to asymptotic behavior. 9. Determine continuity at a point or on intervals and distinguish between the types of discontinuities at a point.			

	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. 11. Determine the derivative and higher derivatives of a function explicitly using differentiation formulas. 12. Determine derivatives implicitly 13. Solve related rates problems. 14. Determine absolute extrema for a continuous function on a closed interval. Use these and other appropriate techniques to solve optimization problems. 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. 16. Determine antiderivatives and indefinite integrals and integrate by substitution. 17. Use the Fundamental Theorem of Calculus to evaluate definite integrals. 18. Use definite integrals to find areas of planar regions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Limits and Continuity Limit of a function, evaluation of limits, continuity. 1- Differentiation Derivative of a function, rules of differentiation, higher derivatives, L'Hôpital's rule. 2- Applications of Differentiation Maximum and minimum, rates of change, differentials, linear approximations, increasing and decreasing functions, curve sketching. 3- Integration Integrals, techniques of integration, applications of integration. 4- Ordinary Differential Equations First order equations, second order linear equations with constant coefficients.
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 : 1. Lectures: Lectures can provide an overview of key concepts and techniques in digital image processing. 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 calculus.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	138	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	8
Total SWL (h/sem) 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 1- Slope and equation of line 2- Function and their graphs 3- Shifts, circle and parabola
Week 2	Chapter 2 1- Limits 2- Limits involving infinity 3- Continues functions 4- Slopes, tangent lines and derivatives
Week 3	Chapter 2 5- Differentiation rule 6- Velocity, speed and other rate of change 7- Derivatives of trigonometric functions 8- Chain rule 9- Maxima, minima
Week 4	Chapter 3 1- Definite integral 2- The fundamental theorem of integral calculus 3- Indefinite integral
Week 5	Chapter 3 4- Integration by substitution 5- A brief introduction to logarithms and exponential 6- Areas between curves, volumes of solids of revolution areas of surfaces of revolution
Week 6	Chapter 4 1- Inverse function and their derivatives 2- $\ln(x)$, e^x, and logarithmic differentiation 3- Hospital rule 4- The inverse trigonometric functions 5- Derivative of inverse trigonometric functions
Week 7	Chapter 5 1- Basic integration formula 2- Integration by parts 3- Trigonometric integral
Week 8	Chapter 5 4- Trigonometric substitution 5- Rational functions and partial fractions 6- Improper integrals

Week 9	Chapter 5 Taylor's series and Maclaurin series
Week 10	Chapter 6 1- Polar coordinate 2- Graphing in Polar coordinate 3- Integration in Polar coordinate
Week 11	Chapter 7 (matrices) 1- Definition of matrix. 2- Equality, addition and multiplication of matrices. 3- Transpose of matrix.
Week 12	Chapter 7 (matrices) 4- Some types of matrices. 5- Determinant of matrix. 6- Adjoint of matrix.
Week 13	Chapter 7 (matrices) 7- Inverse of matrix. 8- Solution of a set of linear equations.
Week 14	Chapter 7 (matrices) 9- Eigenvalues and eigenvectors.
Week 15	Course review, final project presentations, and exam preparation.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

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

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
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (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	Arabic Language I		Module Delivery		
Module Type	B		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	UOB101				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		UGI			Semester of Delivery
Administering Department		S	College	Type College Code	
Module Leader	Leqaa faleh owdaa flaih		e-mail	leqaa.falih@ircoedu.uobaghdad.edu.iq	
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	
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 أهداف المادة الدراسية	1- تعلم مهارات الكتابة والاملاء والتعبير الصحيح خلال تطبيق قواعد اللغة العربية بشكل مفصل وتطبيقي على نصوص عربية. 2- لفهم الجمع وأنواع الاسماء وكيفية التعامل معها. 3- لفهم العدد واستعماله بشكل صحيح من حيث المطابقة والمخالفة للتفريق بين الضاد والظاء. 4- للتفريق ومعرفة استعمال التاء المربوطة والتاء الطويلة. 5- التمييز بين العلامات الاصلية والفرعية. 6- تعلم استعمال الأدوات وعمل كل أداة ومعناها في التعبير.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	هام: اكتب 6 مخرجات تعليمية على الأقل، ومن الأفضل أن تكون مساوية لعدد أسابيع الدراسة 1- التعرف على كيفية جمع الأسماء وأنواع الجموع وسبب اختلافها وقائمة بالمصطلحات المختلفة المرتبطة ببلاغة اللغة العربية تعلم كتابة الهمزة وأنواعها. 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 المحتويات الإرشادية	يتضمن المحتوى الإرشادي ما يلي. 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 وأنواعها والافعال والعلامات الاصلية والفرعية والعدد. ومشكلات الكتابة والاملاء التي يقع فيها الطلبة في التفرقة بين الضاد والظاء والتاء المربوطة والطويلة والهمزة وأنواعها 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 تهم الطلاب.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	30	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	60		

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 الترقيم 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 (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 (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	English Language I			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☐ Tutorial ☐ Practical ☐ 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 أهداف المادة الدراسية	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. 1. Listening Objectives: Understand and respond to basic greetings, introductions, and simple instructions.
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	• Comprehend and extract information from short, simple spoken passages related to everyday topics. • Identify and understand common vocabulary and expressions in spoken English. 2. Speaking Objectives: • Engage in basic conversations using simple greetings, introductions, and expressions related to personal information. • Ask and answer simple questions about personal details, daily routines, and familiar topics. • Participate in short dialogues and role-plays to practice communication skills. 3. Reading Objectives: • Read and comprehend simple texts, such as signs, labels, short passages, and dialogues. • Recognize and understand basic vocabulary words and phrases in context. • Extract information from texts related to everyday situations and topics. 4. Writing Objectives: • Write short sentences and paragraphs about personal information, experiences, and familiar topics. • Fill out basic forms with personal details, such as name, age, and nationality. • Write simple messages, notes, and emails related to everyday situations. 5. Vocabulary and Grammar Objectives: • Acquire a basic vocabulary related to common topics, such as greetings, numbers, time, family, food, and everyday objects. • Understand and use basic grammatical structures, including present simple, present continuous, simple past, and basic question forms. • Recognize and use common prepositions, articles, and basic sentence structures. 6. Cultural Awareness Objectives: • Develop an understanding of cultural customs and practices related to greetings, social norms, and everyday interactions in English-speaking countries. • Gain exposure to cultural elements through reading or listening to texts about customs, traditions, and holidays.
Module Learning Outcomes	By the end of the course, the students will be able to: 1. Listening and Speaking Skills: • Understand and respond appropriately to basic questions and statements.

مخرجات التعلم للمادة الدراسية	- Engage in simple conversations related to personal information, daily routines, and immediate surroundings. - Follow simple instructions and directions. - Develop basic pronunciation and intonation skills. 2. Reading Skills: - Recognize and understand basic vocabulary words and phrases in simple texts. - Comprehend and extract information from short, simple texts such as signs, notices, and labels. - Understand basic sentence structures and common grammatical patterns. 3. Writing Skills: - Write simple sentences and short paragraphs about personal information, experiences, and familiar topics. - Fill out simple forms and write basic personal information. - Write simple messages, notes, and emails related to everyday situations. 4. Vocabulary and Grammar: - Acquire and use a basic range of vocabulary related to everyday topics, such as greetings, numbers, time, family, food, and common objects. - Understand and use basic grammatical structures, including present simple, present continuous, simple past, and basic question forms. - Recognize and use common prepositions, articles, and basic sentence structures. 5. Cultural Awareness: - Develop an understanding of cultural customs and practices related to greetings, social norms, and everyday interactions in English-speaking countries. - Gain exposure to cultural elements through reading or listening to texts about customs, traditions, and holidays.
Indicative Contents المحتويات الإرشادية	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. 2. Use a narrow range of positive and negative adjectives to describe objects, people and places.

	2.3. Exchange information by forming and responding to simple questions. 3. Produce simple sentences using the correct word order and punctuation marks. 4. Use capital and lower case letters accurately in writing. 5. Construct a short guided paragraph on a familiar topic concerning home, family, friends and holidays. 5. Use the basic tenses including the present and past simple, and present continuous correctly. 6. Use the basic auxiliary verbs (am/is/are/was/were/can) and a range of regular and irregular verbs. 7. Demonstrate awareness of the essential grammatical features and functions including questions and negatives, plural nouns, frequency adverbs, possessives, pronouns and determiners.
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	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. 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. 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. 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. 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. 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. 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. 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. 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.
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	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. 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. 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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) 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

	Material Covered
Week 1	Hello! p6 am/are/is, my/your I'm Pablo. My name's Judy.

	What's your name? p6 This is ... This is Ben. Nice to meet you. p7
Week 2	Your world p12he/she/they, his/her He's from the United States. Her name's Karima. p13 They're on holiday. p16 Questions What's his name? Where's she from? p13
Week 3	All about you p18 am/are/is We're all singers. p20 Negatives She isn't a nurse. p18 I'm not from Scotland. p20 They aren't builders. p20 Questions What's her address? How old is she? Is she married? p19 Short answers Yes, she is. / No, she isn't. p20
Week 4	Family and friends p24 Possessive adjectives my, your, our, their p24 Possessive 's Annie's husband Jim's office p24 has/have I have a small hotel. She has a job. We have three sons. p27 Adjective + noun a small hotel a big house a good job p27apples, beer, bread, cake p36

	Shopping newsagent's, chemist's, off-licence p36 Can you come for dinner? Would you like some more rice? Could you pass the salt, please? How would you like your coffee? This is delicious! p37
Week 5	The way I live p32 Present Simple I/you/we/they I like ice-cream. I don't like tennis. Do you like football? p33 Where do you work? Do you live in Dundee? p34 In Brazil they speak Portuguese. p36 a and an a waiter, an actor, an Italian restaurant p34 Adjective + noun an American car Spanish oranges p37
Week 6	Every day p40 Present Simple he/she He gets up at 6.00. He has lunch in his office. p42 She lives in a small house. p44 Questions and negatives What time does he have breakfast? He doesn't live in London. p43 Adverbs of frequency He always works late. He never goes out. p42
Week 7	Mid-term Exam
Week 8	My favourites

	p48 Question words who, where, why, how p48 Pronouns Subject/Object/Possessive I/me/my we/us/our they/them/ their p49 this and that I like this wine. Who's that? p50
Week 9	Where I live p56 There is/are ... There's an old sofa. Are there any armchairs? There are some books. p57 Prepositions in, on, under, next to p58
Week 10	Times past p64 was/were born When were you born? I was born in 1996. p65 Past Simple – irregular verbs went, came, saw She went shopping. p68
Week 11	We had a great time! p72 Past Simple – regular and irregular played, got, watched, did p72 Questions What did you do? Did you go out? p73 Negatives They didn't go to work. p73 ago I went to Rome ten years ago. p78
Week 12	I can do that!

	p80 can/can't He can speak French. I can't draw. Can she run fast? p80 Adverbs I can cook a little bit. I can't cook at all. really well, fluently p82 Requests and offers Can you tell me the time? Can I help you? p83
Week 13	Please and thank you p88 I'd like ... I'd like some ham. How much would you like? p88 some and any I'd like some cheese. Do you have any Emmental? I don't have any apple juice. p89 like and would like I like Coke. I like going to the cinema. I'd like to go out. p91
Week 14	Here and now p96 Present Continuous She's wearing a T-shirt. What's he doing? p97 Present Simple and Present Continuous He lives in London. They're staying in a hotel. p98
Week 15	It's time to go! p104 Future plans They're going on holiday. Which countries are you going to visit? I'm leaving on Tuesday.

	What are you doing this evening? p104 Revision Question words – when, where, who, how p106 Tenses – present, past, and future tenses p110
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

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 www.oup.com and search for "New Headway Plus, Special Edition, Beginner Level " or browse their English language teaching section for information on the course.	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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
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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	Suplement			Theory Lecture Tutorial 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	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1.This course deals with the basic concept of human rights& democracy 2.Clarifying and training students on the most important principles of human rights and democracy. 3.Organizing discussions and presentations on the most vital and basic topics affecting community building, related to human rights and democracy.. 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. 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.
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	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.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Cognitive goals. 10. Educate students and inform them about the importance of human rights and democracy. 11. Recognize and understand the methods of teamwork for the exchange of ideas and creative discussions 12. Developing students' performance through guidance in preparing mini-research on modern vocabulary on vital topics related to human rights and democracy. 13. Providing students with creative development abilities in modern proposals and creative developmental ideas by discussing awareness videos presented on electronic classes. 14. Developing the skills of sharing opinions and ideas and respecting others opinion. 15. Objective Skills : 16. Basic knowledge in the principles of human rights and democracy. 17. Building the innovative personality of knowledge through online research and the transfer and exchange of information. 18. Discuss the various properties about everything related to human rights and their importance in our daily lives. 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 المحتويات الإرشادية	- Developing the student's analytical and critical skills regarding the reality and future of human rights and democracy - 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. - 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.
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 (which helps students to reach the following results: 1- The scientific ability to distinguish between correct information and wrong information. 2- Ease of scientific drafting and ease of correction. 3. Ability to memorize and guess. 4- The ability to link concepts and principles with reality. 5. Ability to invoke, link, interpret.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	1.25
Total SWL (h/sem) 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 الأسبوعي النظري مادة حقوق الإنسان و الديمقراطية

Material Covered	<u>Human rights & Democracy</u>
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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 Human Rights in Judaism, Human rights in Christianity, Human Rights in Islam.
Week 5	Human rights in Renaissance - modern and contemporary societies 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 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. Duties of the Islamic ruler: First: Social Reform: Second: Achieving security and defense Third: The architecture of the country "economic development"
Week 10	Forms of democracy: (1): Direct democracy ,(2): Semi-direct democracy , (3): Parliamentary democracy (parliamentary representation)4): Liberal Democracy (5): consociation Democracy, (6): Delegated Democracy.
Week 11	Conditions for the success of the elements and pillars of the democratic system 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: 1 – Citizenship 2- Political participation 3. Elections 4. MPs and Responsibility

	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 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. Fourth: Lobbying and Democracy.
Week 15	Preparatory Week
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	لا يوجد

Learning and Teaching Resources

مصادر التعلم والتدريس

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

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 (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 الاولى/الفصل الثاني)

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Cartography		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	RSGIS12005			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level		UGI	Semester of Delivery	
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 أهداف المادة الدراسية	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 7.This course deals with the basic concept of cartography 8.Clarifying and training students on the map design.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The learning outcomes: 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 المحتويات الإرشادية	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. 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
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	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
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	90	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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 الأسبوعي النظري مادة رسم الخرائط

	Material Covered <u>Cartography</u>
Week 1	Unit – 1 1.1 Introduction to cartography, nature and scope of cartography
Week 2	1.2 Digital cartography - elements of digital cartography Relation between digital Cartography, RS & GIS

Week 3	1.3 Conventional mapping VS Digital mapping 1.4 Scale, reference and coordinate system
Week 4	Unit – 2 2.1 Cartographic transformations and reasons for transforming cartographic data
Week 5	2.2 Map Projection – concept and classification 2.3 Azimuthal, cylindrical, conical and rectangular projection system
Week 6	2.4 Choice of map projection – Satellite image and map projection
Week 7	Unit – 3 3.1 Mechanics of map construction - Principles of drawing, Base materials -Instruments
Week 8	3.2 Cartographic design - map design principles, symbolisation and lay out
Week 9	3.3 Study of different types of maps, Survey of Iraq maps, layout and Numbering of topographical maps 3.4 Thematic maps and base maps
Week 10	Unit – 4 4.1 Representation of natural and cultural features, relief representations
Week 11	4.2 Map digitization and Map Compilation 4.3 Fair drawing and editing of maps 4.4 Map reproduction process
Week 12	Unit – 5 5.1 Introduction to Global Positioning System (GPS) – Fundamental concepts
Week 13	5.2 GPS system elements and signals
Week 14	5.3 GPS measurements and accuracy of GPS 5.4 Classification of GPS receivers
Week 15	Preparatory Week
Week 16	Final Exam

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 2) Mishra R.P and Ramesh A. 1989: Fundamentals of Cartography. Concept publishing	Yes
Recommended Texts	1) company Nag P. and Kudrat M. 1998: Digital Remote Sensing. Concept Publication 2) Rampal K.K. 1993: Mapping and compilation. Concept publication 3) Robinson A., Morrison, J.L., Muehrcke P.C., Guptil S.C. 2002: Elements of Cartography. 4) John Wiley Taylor,D.R.F. 1985: Education and Training in contemporary cartography, John Willey	Yes
Websites		

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (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 (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.

Module Information

معلومات المادة الدراسية

Module Title	Environmental Science		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	RSGIS12006				
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	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

Module Objectives	1. Understand the scientific principles and concepts that underlie environmental science, including ecological systems, biogeochemical cycles, and environmental economics.
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أهداف المادة الدراسية	- Identify and describe the major environmental challenges facing the planet, such as climate change, biodiversity loss, pollution, and resource depletion. - Analyze the impacts of human activities on the environment, including the use of natural resources, land use change, industrial and agricultural practices, and urbanization. - Evaluate the effectiveness of different policies and strategies to address environmental issues, such as pollution control, conservation, and renewable energy development. - Explore the ethical and social dimensions of environmental issues, including environmental justice, sustainability, and the role of individuals and communities in promoting environmental stewardship. - Develop critical thinking and problem-solving skills through interdisciplinary approaches to environmental issues, incorporating perspectives from science, economics, policy, and social science. - Demonstrate effective communication skills through written and oral presentations of environmental science research, data analysis, and policy analysis. - Apply quantitative methods and analytical tools to environmental science research, such as statistical analysis, modeling, and GIS mapping. - 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. - Develop a deep appreciation for the complexity and interconnectedness of ecological systems, and the importance of interdisciplinary approaches to understanding and addressing environmental issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Demonstrate a comprehensive understanding of key environmental science concepts and principles, including ecosystem dynamics, biogeochemical cycles, and sustainable development. - 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. - 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. - Apply quantitative methods and analytical tools to environmental science research, such as statistical analysis, modeling, and geographic information systems (GIS) mapping. - Communicate environmental science research findings and recommendations effectively through written and oral presentations, using appropriate scientific and technical language and visual aids. - Assess the ethical and social dimensions of environmental issues, including environmental justice, equity, and the role of indigenous knowledge and traditional ecological knowledge. - 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. - Engage in collaborative problem-solving and decision-making processes related to environmental issues, using effective communication, critical thinking, and conflict resolution skills. - Develop a deep appreciation for the complexity and interconnectedness of natural systems and the importance of interdisciplinary approaches to understanding and addressing environmental challenges. 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.
Indicative Contents	Introduction to Environmental Science: Overview of the interdisciplinary nature of environmental science and its importance in understanding and addressing environmental challenges.

المحتويات الإرشادية	- Ecological Systems: The principles of ecology, including the structure and function of ecosystems, the biogeochemical cycles, and the interactions between organisms and their environment. - Climate Change: The causes, consequences, and mitigation strategies for global climate change, including the role of greenhouse gases, energy systems, and policy solutions. - 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. - 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. - 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. - 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. - Renewable Energy and Energy Efficiency: The principles and technologies of renewable energy sources, including wind, solar, and hydroelectric power, and energy efficiency strategies. - 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. - 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. - 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. - 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.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- 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. - Case Studies: Case studies can be used to illustrate real-world environmental issues and challenges, and to encourage critical thinking and problem-solving skills. - Group Discussions: Group discussions can be used to promote collaboration and critical thinking, and to encourage students to engage with different perspectives and ideas. - 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. - 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. - 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. - 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.

	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. 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. 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. 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.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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 Environmental Science - Overview of course objectives and expectations - Introduction to key concepts in environmental science, including ecological systems, sustainability, and environmental ethics

Week 2	Principles of Ecology - Introduction to ecological principles, including the structure and function of ecosystems, biotic and abiotic factors, and energy flow - Ecological interactions, including competition, predation, and symbiosis
Week 3	Climate Change - Introduction to climate change and its causes, such as greenhouse gas emissions and deforestation - Impacts of climate change on the environment and human societies, including sea level rise, extreme weather events, and food security
Week 4	Biodiversity and Conservation - Introduction to biodiversity and its importance - Threats to biodiversity, including habitat destruction and climate change - Strategies for conservation, including protected areas, ecosystem restoration, and sustainable use of natural resources
Week 5	Pollution - Introduction to different types of pollution, including air, water, and soil pollution - Impacts of pollution on human health and the environment - Pollution control strategies, including regulation, technology, and behavioral change
Week 6	Environmental Policy and Management - Overview of environmental policy and its evolution over time - Analysis of different policy approaches, including regulatory and market-based mechanisms - Strategies for environmental management, including environmental impact assessment and sustainable development
Week 7	Land Use and Food Systems - Impacts of land use change, urbanization, and agriculture on the environment, including soil degradation, deforestation, and food security challenges - Sustainable land use and food system strategies, including agroforestry, urban agriculture, and sustainable agriculture practices
Week 8	Renewable Energy and Energy Efficiency - Introduction to renewable energy sources, including solar, wind, and hydroelectric power - Energy efficiency strategies, including building design and transportation choices
Week 9	Environmental Ethics and Justice - Overview of environmental ethics and its importance in environmental science - Analysis of environmental justice issues, including disproportionate impacts of environmental hazards on marginalized populations - Strategies for promoting environmental equity and justice
Week 10	Interdisciplinary Approaches to Environmental Science - Importance of interdisciplinary approaches to understanding and addressing environmental challenges

	- Integration of science, economics, policy, and social science in environmental science research and analysis
Week 11	Case Studies in Environmental Science - Examination of real-world environmental challenges, including case studies of local and global environmental issues and the application of environmental science principles and strategies - Analysis of environmental solutions and their effectiveness
Week 12	Case Studies in Environmental Science - Examination of real-world environmental challenges, including case studies of local and global environmental issues and the application of environmental science principles and strategies - Analysis of environmental solutions and their effectiveness
Week 13	Research Projects - Development and implementation of research projects related to environmental science - Data collection and analysis using environmental science research methods
Week 14	Research Projects - Development and implementation of research projects related to environmental science - Data collection and analysis using environmental science research methods
Week 15	Environmental Science Communication - Effective communication of environmental science research findings and recommendations to different audiences - Use of scientific and technical language, visual aids, and other communication strategies
Week 16	: Course Review and Reflection - Course reflection and evaluation of learning outcomes - Discussion of future directions for environmental science research and action.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
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Required Texts	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. 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. 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. 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.	No
Recommended Texts	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. 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. 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. 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.	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 (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 (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	Statistics			Module Delivery	
Module Type	RSGIS12007			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ 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 فحطان 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 أهداف المادة الدراسية	1. Understand the basics of probability and distribution functions such as binomial, normal, and Poisson distributions. 2. Calculate and interpret measures of central tendency (mean, median, mode) and dispersion (range, variance, standard deviation) for data sets. 3. Use statistical graphs and charts like histograms, bar charts, box plots, and scatter plots to visualize and analyze data. 4. Understand the concepts of populations, samples, and sampling methods including random, stratified, cluster and systematic sampling. 5. Perform hypothesis testing using the z-test, t-test, chi-square test, ANOVA and other statistical tests. Interpret p-values and confidence intervals. 6. Estimate parameters and test hypotheses using statistical software like Excel, Minitab, R or SAS. 7. Distinguish between correlation and causation, and calculate and interpret correlation coefficients for data sets. 8. Apply statistical analysis techniques to real world examples from various disciplines like business, health sciences, social sciences, engineering, etc. 9. Develop an understanding of statistical concepts and reasoning to think critically about uses and limitations of statistics. 10. Improve technical communication skills through writing statistical analyses and interpretations in a clear and organized manner.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Students will be able to calculate and interpret measures of central tendency and dispersion for data sets. • Students will understand basic probability concepts and properties of probability distributions. • Students will be able to select and apply appropriate graphical representations for different types of data. • Students will be able to apply appropriate sampling methods based on the research context. • Students will be able to perform hypothesis testing using statistical software and interpret the results, including p-values and confidence intervals.

	• Students will be able to distinguish between correlation and causation when analyzing relationships between variables. • Students will be able to apply statistical analysis techniques to real world examples and case studies from various disciplines. • Students will think critically about the proper use of statistics and limitations of statistical analysis. • Students will effectively communicate statistical analyses and interpretations in writing for different audiences. • Students will develop quantitative reasoning skills to make evidence-based decisions using statistics. • Students will gain the ability to interpret statistical results reported in research studies and the media with a critical perspective.
Indicative Contents المحتويات الإرشادية	1. Introduction to statistics and probability - Overview of statistics and its applications - Components of a data set - Basic probability rules and concepts - Probability distributions: binomial, normal and Poisson 2. Descriptive statistics - Measures of central tendency: mean, median, mode - Measures of dispersion: range, quartiles, variance, standard deviation - Frequency distributions and histograms - Stem and leaf plots, dot plots, box plots - Measures of skewness and kurtosis 3. Probability distributions - The normal distribution and the central limit theorem - The binomial distribution - The Poisson distribution 4. Sampling and sampling distributions - Populations and samples - Sampling methods - Sampling distributions - Standard error 5. Inference - Point estimation and interval estimation - Hypothesis testing (z-test, t-test, chi-square test, ANOVA) - Type I and type II errors, significance level

	6. Correlation and regression - Correlation coefficients - Simple linear regression - Predicting with regression models 7. Analysis using statistical software - Data input, cleaning and manipulation - Graphs and summary statistics - Hypothesis testing commands - Regression analysis 8. Real world applications - Case studies from business, health sciences, social sciences, etc. 9. Effective communication of statistical results - Reporting measures of central tendency and dispersion - Graphically presenting data - Interpreting statistical tests and models
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	• Lectures: Initial introduction to concepts and methods through lectures. This helps provide a foundation of knowledge. • Demonstrations: Use demonstrations and worked examples to illustrate statistical procedures and interpretations. This helps make abstract concepts more concrete. • 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. • Group activities: Assign group projects involving real world data analysis and interpretation. This fosters teamwork and collaboration skills. • 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. • Case studies: Discuss real world applications and case studies from various disciplines. This helps students see the relevance of statistics. • Discussions: Have in-class discussions for students to exchange ideas and interpretations. This deepens understanding through peer learning. • Project work: Assign a final individual or group project for students to conduct an independent statistical analysis. This assesses higher order skills.
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	- Formative assessment: Use quizzes, exercises and other low-stakes assessments to provide ongoing feedback for students. This helps monitor progress and identify gaps. - Summative assessment: Use exams and final projects to assess overall learning at the end. This provides accountability. - Seek feedback: Regularly seek feedback from students about the course to identify areas for improvement. Adjust strategies based on student needs.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) 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)

المناهج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Statistics - Definition and importance of statistics - Types of data and scales of measurement - Data collection methods - Descriptive vs. inferential statistics
Week 2	Probability

	- Basic probability concepts - Conditional probability - Bayes' theorem - Probability distributions
Week 3	Sampling and Sampling Distributions - Simple random sampling - Sampling distributions - Central Limit Theorem - Standard error
Week 4	Confidence Intervals - Interpretation and construction of confidence intervals - Margin of error - Sample size determination - Confidence intervals for proportions
Week 5	Hypothesis Testing - Null and alternative hypotheses - Type I and Type II errors - p-values - One-sample and two-sample hypothesis tests
Week 6	: Inference for Means - One-sample and two-sample t-tests - Paired t-tests - Confidence intervals for means - Assumptions of inference for means
Week 7	Inference for Proportions - Confidence intervals for proportions - Hypothesis testing for proportions - Sample size determination for proportions - Assumptions of inference for proportions
Week 8	Analysis of Variance (ANOVA) - One-way ANOVA - Two-way ANOVA

	- Post-hoc testing - Assumptions of ANOVA
Week 9	Simple Linear Regression - Association and correlation - Simple linear regression model - Inference for regression coefficients - Residual analysis and diagnostics
Week 10	Multiple Linear Regression - Multiple regression model - Inference for regression coefficients - Model selection and diagnostics - Assumptions of multiple linear regression
Week 11	Categorical Data Analysis - Chi-square goodness-of-fit test - Contingency tables - Tests of independence - Measures of association
Week 12	Nonparametric Methods - Wilcoxon rank-sum test - Kruskal-Wallis test - Spearman's rank correlation - Assumptions of nonparametric methods
Week 13	: Time Series Analysis - Time series components - Stationarity and differencing - Autocorrelation and partial autocorrelation - ARIMA models
Week 14	Bayesian Statistics - Bayes' theorem revisited - Prior and posterior distributions - Markov Chain Monte Carlo (MCMC) methods - Bayesian model selection

Week 15	Review and Exam Preparation - Review of key concepts and topics - Exam preparation strategies - Practice problems and quizzes
Week 16	Final Exam - Comprehensive final exam covering all course material.

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

	- Margin of error - Sample size determination - Hypothesis testing and p-values
Week 6	One-Sample and Two-Sample t-tests - One-sample t-test - Two-sample t-test - Paired t-test - Assumptions of t-tests
Week 7	Analysis of Variance (ANOVA) - One-way ANOVA - Two-way ANOVA - Post-hoc testing - Assumptions of ANOVA
Week 8	Simple Linear Regression - Association and correlation - Simple linear regression model - Inference for regression coefficients - Residual analysis and diagnostics
Week 9	Multiple Linear Regression - Multiple regression model - Inference for regression coefficients - Model selection and diagnostics - Assumptions of multiple linear regression
Week 10	Categorical Data Analysis - Chi-square goodness-of-fit test - Contingency tables - Tests of independence - Measures of association
Week 11	Nonparametric Methods - Wilcoxon rank-sum test - Kruskal-Wallis test - Spearman's rank correlation

	- Assumptions of nonparametric methods	
Week 12	Time Series Analysis - Time series components - Stationarity and differencing - Autocorrelation and partial autocorrelation - ARIMA models	
Week 13	Bayesian Statistics - Bayes' theorem revisited - Prior and posterior distributions - Markov Chain Monte Carlo (MCMC) methods - Bayesian model selection	
Week 14	Multivariate Analysis - Principal Component Analysis (PCA) - Factor Analysis (FA) - Cluster Analysis - Discriminant Analysis	
Week 15	Survival Analysis - Survival curves and hazard rates - Kaplan-Meier estimator - Log-rank test - Cox proportional hazards model	
Week 16	Review and Exam Preparation - Review of key concepts and topics - Exam preparation strategies - Practice problems and quizzes	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?

Required Texts	1. "Statistics: The Art and Science of Learning from Data" by Alan Agresti and Christine Franklin 2. "Elementary Statistics" by Mario F. Triola 3. "Statistics for Engineers and Scientists" by William Navidi 4. "Statistics for Business and Economics" by David Anderson, Dennis Sweeney, and Thomas Williams 5. "Introduction to Probability and Statistics" by William Mendenhall, Robert Beaver, and Barbara Beaver	No
Recommended Texts	1. "Learning Statistics with R" by Danielle Navarro - This book provides an introduction to statistical analysis using the R programming language. 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. 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. 4. "Doing Bayesian Data Analysis" by John Kruschke - This book provides an introduction to Bayesian data analysis using the R programming language. 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.	No

Khan Academy - <https://www.khanacademy.org/math/statistics-probability>

- Khan Academy has excellent free video lessons covering statistics and probability concepts from the basics to more advanced topics.

Statistics How To - <https://www.statisticshowto.com/>

- This is a comprehensive statistics resource with lessons, definitions, formulas, calculators and examples to help you learn statistics step by step.

Stat Trek - <http://stattrek.com/>

- Stat Trek has a great collection of statistics tutorials, lessons, dictionaries and references organized by type and difficulty level.

Statistics Solutions - <https://www.statisticsolutions.com/>

- Statistics Solutions provides lots of free resources including explanations, tutorials, examples and exercises on various statistical topics.

CoolStats - <https://stattrek.com/coolstats>

- CoolStats aims to make statistics fun with interesting examples, interactive tools and visualizations.

University of Florida Library Guide - <https://guides.uflib.ufl.edu/statista>

- This is a useful guide to finding statistics resources, tutorials, software and data from the University of Florida Libraries.

Youtube Channels:

- Khan Academy Statistics
- StatQuest with Josh Starmer
- Jake VanderPlas (Data Science, Statistics and Python)

Software Websites:

- Excel (Microsoft) for basic statistics
- Minitab
- RStudio (Free and open source)
- SAS Institute
- SPSS (IBM)

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	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	Geology			Module Delivery	
Module Type	RSGIS12008			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ 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		
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 أهداف المادة الدراسية	• Understand the basic concepts of geology including the rock cycle, plate tectonics, seismic activity, and geological time scale • Identify and classify common rock and mineral types based on their physical and chemical properties • Explain how different geological processes shape the Earth's surface, including weathering, erosion, deposition, folding, faulting and metamorphism • Describe the formation and structure of tectonic plates, and how plate movements relate to phenomena like earthquakes, volcanoes and mountain building • Understand the progression of life through geological time and how fossils are formed and studied by geologists • Apply geological concepts to interpret geologic features and landscapes through field observations and maps reading • Develop skills to think scientifically, evaluate geological evidence critically and apply knowledge to real world problems • Gain experience using tools and equipment relevant to the geological field, including compasses, clinometers, maps and online databases • Understand the role of geology in exploiting natural resources and mitigating natural hazards like landslides, volcanic eruptions and earthquakes • Develop an appreciation for the history of the earth and how geology contributes to our understanding of the planet and life on it
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Students will identify and classify common rock and mineral types based on their properties • Students will categorize different types of rocks based on their origins and relate these to the rock cycle. • Students will explain the theory of plate tectonics and relate plate movements to geological activities and structures. • Students will analyze geological maps and diagrams to interpret geological formations, structures and processes. • Students will identify important periods in geological time and place key events in Earth's history in the correct chronological order. • Students will describe the formation of fossils and use fossil evidence to interpret changes in life through geological time. • Students will apply knowledge of geology to explain geological hazards like landslides, earthquakes and volcanic eruptions. • Students will think critically to evaluate geological data and explanations. • Students will communicate geological concepts and ideas effectively in writing and verbally. • Students will demonstrate safe and proper use of geological tools, experimental techniques and field equipment. • Students will develop an awareness of how geology applies to topics like natural resource exploitation and environmental issues. The key parts of effective learning outcomes are: • An action verb describing an observable or measurable student action - identify, explain, analyze, etc. • A clear subject or topic that students will demonstrate knowledge of - rocks, plate tectonics, geological time

	• A defined condition specifying any limits or constraints - based on their properties, using geological maps, applying knowledge to hazards, etc. • An implied standard of achievement - correctly, accurately, effectively, critically, properly, etc.
Indicative Contents المحتويات الإرشادية	•Introduction to geology and the earth - Core and mantle structure - Structure of the earth's outer crust - Plate tectonics and the rock cycle •Minerals and rocks - Physical and chemical properties of minerals - Classifying minerals and rocks - Igneous, sedimentary and metamorphic rocks •Geological time - Geological events through time - Fossils, index fossils and the fossil record - Relative and absolute dating techniques •Earthquakes and volcanoes - Causes and characteristics of earthquakes - Distribution of volcanoes and eruption types - Effects of earthquakes and volcanic eruptions •Landscapes and surface processes - Weathering and erosion - Mass movement and mass wasting - Deposition and sedimentation •Structural geology - Stress and strain within rocks - Folding and faulting of rock strata - Interpreting geological structures and maps •Applied geology - Geological hazards and risk assessment - Natural resources and exploitation - Environmental geology •Field work and mapping (practical component)

	- Using geological equipment and maps - Observing and interpreting rock exposures - Measuring geological features
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	• Lectures - To introduce key concepts, theories and processes. Lectures should be interactive with questions, discussions and activities. • Practical classes - Hands-on work with rock and mineral samples, maps, field trips and using tools and equipment. This reinforces concepts through practical experience. • Demonstrations - To show students geological phenomena and processes that they cannot observe directly, using models and multimedia. • Field work - Site visits and field trips to observe real geological features and landscapes, collect data and practice mapping skills. • Discussion - In-class debates and group work to explore geological problems, evaluate evidence and develop critical thinking. • Interactive software - Using programs to simulate geological processes, identify rock and mineral samples, and interpret maps and data. • Problem solving tasks - Working through real world geological scenarios to apply knowledge and develop analytical skills. • Formative assessment - Regular lower-stakes tests, quizzes and assignments with feedback to monitor student progress. • Geological models - Using physical and virtual 3D models to illustrate geological structures and processes in a hands-on way. • Case studies - Exploring real examples of how geology is applied to solve practical problems or answer research questions. • Self-directed learning - Encouraging students to conduct their own research into particular topics of interest using online resources. • Multimedia - Utilizing videos, animations and images to illustrate geological concepts that are difficult to see directly.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) 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 geology - Origins of geology, earth structure, rock cycle
Week 2	Minerals - Properties, classification, identifying features
Week 3	Igneous rocks - Forming processes, textures, identifying features
Week 4	Sedimentary rocks - Forming processes, structures, identifying features
Week 5	Metamorphic rocks - Forming processes, grades, textures
Week 6	Geological time scale - Geological eras, periods and epochs
Week 7	Plate tectonics - Theory, plate boundaries, crustal movements
Week 8	Earthquakes and volcanoes - Mechanisms, monitoring, effects
Week 9	Weathering and erosion - Weathering processes, landforms
Week 10	Streams and deposition - Sediment transport, landforms
Week 11	Fossils - Formation, types, uses
Week 12	Structural geology - Stress and strain, folding and faulting
Week 13	Geological maps - Reading, interpreting and constructing maps
Week 14	Applied and environmental geology - Natural resources, hazards
Week 15	Revision and review
Week 16	Exams

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Lab safety and equipment
Week 2	Minerals - hardness test, streak test, luster
Week 3	Igneous rocks - texture, grain size
Week 4	Sedimentary rocks - particle size, sorting, rounding
Week 5	Metamorphic rocks - foliations, lineations
Week 6	Fossils - characteristics, types
Week 7	Topographic maps - contours, gradients
Week 8	Aerial photos - identifying geological features
Week 9	Geologic map skills - strike and dip, outcrops
Week 10	Rock mechanics - tensile/compressive strength
Week 11	Soil properties - classification, texture
Week 12	Groundwater - permeability, porosity
Week 13	Seismic data - interpreting P and S waves
Week 14	Geologic hazards - risk assessment
Week 15	Applied geology - natural resources
Week 16	Lab cleanup, post-lab assessments In this lab-focused approach: •Weeks 2-5 focus on identifying and classifying rocks and minerals. •Weeks 6-9 build mapping skills through interpreting maps, photos and geologic maps. •Weeks 10-13 cover practical techniques like rock testing, soil analysis, groundwater studies and seismic data interpretation. •Weeks 14 and 15 apply geological knowledge to real world issues of hazards and resources. Lab activities provide hands-on experience that helps cement theoretical knowledge from lectures. Post-lab assessments and assignments throughout allow students to demonstrate their learning and skill development. Lab cleanup and post-lab assessments in the final week wrap up the course.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	1. "Earth: An Introduction to Physical Geology" by Edward J. Tarbuck, Frederick K. Lutgens, and Dennis Tasa 2. "Essentials of Geology" by Stephen Marshak 3. "Physical Geology" by Charles C. Plummer, Diane H. Carlson, and Lisa Hammersley	No
Recommended Texts	1. "The Geology Book" by Dr. John D. Morris - This book provides an overview of geology from a biblical perspective. 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.	No

Websites	•USGS (United States Geological Survey) - https://www.usgs.gov/ 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. •Geology.com - https://geology.com/ 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. •National Geographic - https://www.nationalgeographic.org/subjects/earth-science/ National Geographic has many excellent articles, photos and videos on geology, earth science, natural disasters and other related topics. •Khan Academy - https://www.khanacademy.org/science/earth-sciences 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. •Digital Library of Earth Sciences - https://digital-earth.nasa.gov/ 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. •OpenTopography - https://www.opentopography.org/ 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. •Earth Observatory - https://earthobservatory.nasa.gov/ The Earth Observatory by NASA features maps, images and articles about earth science and geology. It covers current research and major events. •USGS Earthquake Hazards Program - https://www.usgs.gov/natural-hazards/earthquake-hazards This part of the USGS website focuses on earthquakes, including real time data, maps and information about earthquakes around the world.	
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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 (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	Computer I		Module Delivery	
Module Type	B		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOB203			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level		UGI		
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

Module Objectives أهداف المادة الدراسية	☐ To introduce students to fundamental programming concepts using Python. ☐ To develop problem-solving skills and logical thinking through coding exercises. ☐ To provide hands-on experience with Python for data manipulation and analysis. ☐ To prepare students for advanced topics in computer science and software development.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	☐ Understand and apply basic programming constructs: variables, data types, and control structures. ☐ Develop, test, and debug Python programs. ☐ Use Python libraries for data handling and analysis. ☐ Write reusable and modular code using functions and modules. ☐ Implement data structures such as lists. ☐ Apply object-oriented programming concepts in Python.
Indicative Contents المحتويات الإرشادية	☐ Introduction to Python and its environment. ☐ Basic syntax and semantics of Python. ☐ Control structures: loops and conditionals. ☐ Functions: definition, scope, and recursion. ☐ Data structures: lists. ☐ File handling and exceptions. ☐ Introduction to libraries for data analysis (e.g., pandas, numpy).

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	☐ Lectures to introduce theoretical concepts. ☐ Practical lab sessions for hands-on experience. ☐ Weekly assignments to reinforce learning. ☐ Group projects to encourage collaboration. ☐ Continuous assessment through quizzes and tests.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) 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)

المناهج الأسبوعية النظرية

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

Week 14	Data Objects Using Objects - String, File - Objects
Week 15	Introduction to Lists Building Lists
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي العملي

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Severance, Charles. Python for everybody: Exploring Data using .python 3. Charles Severance, 2016	Available in the Library?
Required Texts	Python for Everybody: Exploring Data in Python 3, by Charles Severance	No
Recommended Texts	☐ Automate the Boring Stuff with Python, by Al Sweigart ☐ Learning Python, by Mark Lutz	No

Websites	☐ Python Official Documentation ☐ W3Schools Python Tutorial ☐ GeeksforGeeks Python
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Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (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 (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.