Level Four
(UGIV)
Semester Seven

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Digital Image Processing			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CSC47130				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1 **4**		**Semester of Delivery**	**7**	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Mohammed Sabih Dr. Rafal Ali Sameer		**e-mail**	mohammed.s@sc.uobaghdad.edu.iq rafal.a@sc.uobaghdad.edu.iq	
Module Leader's Acad. Title	Asstistant Prof. 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	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CSC11004, CSC36126	**Semester**	1,6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Student will be able to: - Define the scope of the image processing field and gain experience in applying image processing algorithms to real problems. - Discuss briefly the principal approaches and algorithms used in digital image processing. - Learning digital image fundamentals and formation, image sensing and acquisition, sampling and quantization, image types, digital image operations, edge detection, image segmentation techniques, differentiate the image processing in frequency domain and spatial domain, and color image processing. - Use C# computer programming environment to process digital images in the LAB.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, students should be able to: - Theoretical foundations and modern applications in Digital Image Processing. - Image processing fundamentals and image processing programming using image functions. - Image enhancement, image classes and how to handle image file. - Design C# program functions that can be used to process different images. - Build image processing toolbox including many images processing functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Part A - Image Definition and Application [4 hrs] Image Acquisition, Enhancement, Restoration, and Color model [6 hrs] Digital Image Statistics [4 hrs] Spatial Domain Methods [6 hrs] Filters and Images [6 hrs] Time and Frequency Domain [4 hrs] Fourier Transform [4 hrs] Image Segmentation [4 hrs] Part B – Programming in C# Learning C# Language [4 hrs] Processing image [10 hrs] Apply methods and algorithms on images [12 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	The aim of studying this module is Learning the strategies of image acquisition, processing, and applications. The methods execute practically in C# Language.

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	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	3, 6, 10	LO # 3, #6, #10
	Assignments	5	10% (10)	2, 5, 8, 11, 15	LO #2, #5, #8, #11, #15
	Projects / Lab.	2	15% (15)	Continuous	All
	Report	1	5% (5)		LO #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	14	All
	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 Image
Week 2	Image Definition and Applications
Week 3	Digital Image Acquisition
Week 4	Color Models
Week 5	Image Processing System Components and Number System

Week 6	Spatial Domain
Week 7	Image and Filters
Week 8	Image Enhancement
Week 9	Image Restoration
Week 10	Frequency Domain
Week 11	Forward Fourier Transform
Week 12	Backward Fourier Transform
Week 13	**Mid-term Exam**
Week 14	Image Segmentation – Part 1
Week 15	Image Segmentation – Part 2
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Learning C# Language
Week 2	Image Basics: Image Loading, Saving and RGB Decomposition
Week 3	Image Manipulations: Graded Image Creation and Flipping
Week 4	Color Conversions: Grey Scale Conversion, Binarization and Inversion
Week 5	Image statistics and histogram
Week 6	Image Contrast Enhancement: Contrast Stretching
Week 7	Image Contrast Enhancement: Histogram Equalization
Week 8	Image Brightness Enhancement: Gamma Correction
Week 9	Image Noise: Impulse Noise, Gaussian Noise, Speckle Noise
Week 10	Linear Smoothing Filters: Mean and Weighted Mean
Week 11	Order Smoothing Filters: Min, Max, Median and K_Mean
Week 12	Gradient Filters: Prewitt, Sobel and Laplace
Week 13	Image Transforms: Discrete Fourier Transform (DFT) and Low Pass Filter
Week 14	Image Transforms: Discrete Wavelets Transform (DWT)
Week 15	Image Transforms: Discrete Cosine Transform (DCT)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Textbook**: Rafael C. Gonzalez, Richard E. Wood. Digital image processing 4th edition **2018**. Pearson Education Limited 2018.	Yes
Recommended Texts	Ian T. Young, Jan J Gerbrands, Lucas J. van Vliet, Fundamentals of Image Processing.	No
Websites	1. https://www.geeksforgeeks.org/digital-image-processing-basics/ 2. https://sisu.ut.ee/imageprocessing/book/1	

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 DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Databases Management System			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CSC47131				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		4	**Semester of Delivery**		7
Administering Department		Computer Science	**College**	Science	
Module Leader	Mehdi G. Duaimi		**e-mail**	mehdi.k@sc.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		6/8/2025	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CSC36128	**Semester**	6
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Designing and creating relational database schemas.

	2. Applying normalization techniques for data integrity. 3. Optimizing database performance. 4. Understanding transaction management, concurrency, and recovery control. 5. Integrating databases with applications. 6. Applying relational database knowledge to real-world scenarios.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Designing and creating relational databases. 2. Applying normalization and ensure data integrity. 3. Managing databases, including backup, recovery, and security. 4. Connecting databases with applications. 5. Responsible for ensuring that databases are running efficiently and safely. 6. Ensuring that authorized users can access this information when needed.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Structured Query Language (SQL) [15 hrs] • Retrieving data with SELECT statements; • Joins and subqueries 2. Relational Database Design [20 hrs] • Normalization techniques 3. Database Performance Optimization [5 hrs] • Query optimization techniques • Normalization and denormalization trade-offs • Database tuning and optimization 4. Transaction Management and Concurrency Control [10 hrs] • ACID properties of transactions • Locking mechanisms and concurrency control 5. Advanced Database Concepts [5 hrs] • Backup and recovery strategies 6. Real-world Application of Relational Databases [10 hrs] • Analyzing requirements for a database application

	• Designing and implementing a database schema

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	These strategies may include a mix of theoretical and practical approaches. Theoretical instructions involve lectures, presentations, and discussions to explain the concepts of relational databases. Also; Hands-on activities, such as individual and group exercises, assignments, and projects, should be incorporated to provide practical experience in designing, implementing, and querying databases. Case studies and real-world examples can help students understand how to apply their knowledge to solve actual problems. Additionally, interactive sessions, demonstrations, and workshops using popular database management systems and SQL tools can enhance the learning experience.

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	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	4 and 11	LO #2, #3 and #5,
	Assignments	2	5% (5)	3 and 10	LO #3, #4 and #6,
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	5% (5)	13	LO #2, #3 and #5
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 – #6

	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Database Design Theory and Methodology
Week 2	Relational Database Design & Implementation
Week 3	Functional Dependencies
Week 4	Inference Rules for Functional Dependencies
Week 5	Normalization; Defining Normal Forms:
Week 6	Basic and Further Normal forms
Week 7	Schema Refinement in Database Design
Week 8	The Database Application System Life Cycle
Week 9	Schema and Transaction Design
Week 10	Transaction management and concurrency control
Week 11	Database Tuning; Tuning the Database Design
Week 12	Database Performance Optimization
Week 13	Database Recovery
Week 14	Extended Database Design
Week 15	Review
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Select Query
Week 2	Total Query & Group Functions
Week 3	Crosstab Query
Week 4	Join Queries
Week 5	Action Queries
Week 6	Union Query and Select Query with Special Operators

Week 7	Subquery Queries
Week 8	Creating and working with Forms
Week 9	Creating and working with Reports
Week 10	Creating and working with Macros and Modules
Week 11	Working with Windows-based DB Application
Week 12	Other Applications
Week 13	Query optimization techniques
Week 14	Review
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ Raghu Ramakrishnan , Johannes Gehrke, "Database Management Systems", 4th Edition, McGraw Hill, 2018. ➢ S. Sumathi, S. Esakkirajan, "Fundamentals of Relational Database Management Systems", Springer, 2007.	As a pdf
Recommended Texts	➢ David M. Kroenke, David J. Auer. "Database processing : fundamentals, design, and implementation."—Edition 15, Pearson Education, Prentice Hall. 2018. ➢ Mike McGrath. 'Access in easy steps: Illustrated using Access 2019 Paperback. In Easy Steps Limited (2019).	As a pdf
Websites	➢ https://www.inderscience.com/jhome.php?jcode=ijiids ➢ https://www.sciencedirect.com/topics/immunology-and-microbiology/database-management-system	

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Introduction To Internet of Things (IoT)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒**Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**CSC47132**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1 4		**Semester of Delivery**	8	
Administering Department	Computer Science		**College**	Science	
Module Leader	Safaa K. Alwajidi		**e-mail**	Safaa.alwajidi@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	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer Networks CSC35120	**Semester**	5
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objectives of the IoT course are to provide students with a comprehensive understanding of IoT architecture, networking principles, cybersecurity, and data management techniques. Students will gain knowledge about the fundamental architecture of IoT, including sensor devices, connectivity protocols, and cloud-based platforms. Additionally, students will comprehend critical concepts of IoT cybersecurity, identifying vulnerabilities, and implementing security measures. They will develop proficiency in data

	acquisition techniques, data cleaning and preprocessing, and data management strategies specific to IoT. By the end of the course, students will have the basic skills to design, implement, and secure IoT systems with focus on effectively manage and process IoT data.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1- Students will have a comprehensive understanding of IoT architecture, including sensor devices, connectivity protocols, and cloud-based platforms. 2- Students will have the theoretical knowledge of IoT communication models and networks to design and construct basic IoT systems, integrating sensors and cloud-based service. 3- Students will have the fundamental principles knowledge of IoT cybersecurity, including authentication, encryption, access control, and secure communication protocols. Also, Students will have knowledge of potential security vulnerabilities in IoT systems. 4- Students will practice acquire data from sensors, in smartphone and smart watches, using effective acquisition techniques and apply data cleaning and preprocessing methodologies for reliable analysis. 5- Students will effectively apply data processing techniques, such as filtering, aggregation, and analysis, to extract meaningful insights from IoT data using relevant tools and technique. 6- Students will employ data management strategies specific to IoT, including data storage, retrieval, and data lifecycle management.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy to achieve the objectives and outcomes of the IoT course involves the following four key elements. Firstly, providing comprehensive theoretical knowledge through lectures and discussions to build a strong foundation in IoT architecture, networks, cybersecurity, and data management. Secondly, incorporating hands-on practical exercises and projects that allow students to apply their knowledge and skills in designing and implementing IoT systems, acquiring and processing data, and securing IoT environments. Finally, implementing regular assessments and feedback mechanisms to track students' progress.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**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	5% (5)	2 and 4	LO # 1, #2
	Assignments	2	10% (10)	6 and 10	LO #1 - #5
	Lab.	1	20% (20)	13	ALL
	Report & Presentation	1	5% (5)	14	ALL
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	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 IoT
Week 2	IoT architecture, including sensor devices and connectivity protocols
Week 3	
Week 4	IoT architecture: Cloud-based platforms
Week 5	IoT communication models and networks to design and construct basic IoT systems, integrating sensors and cloud-based service.
Week 6	
Week 7	Mid-term Exam
Week 8	IoT cybersecurity: Authentication, encryption, access control, and secure communication protocols.
Week 9	IoT cybersecurity: Potential security vulnerabilities in IoT systems.
Week 10	Data acquisition and collection techniques
Week 11	

Week 12	Data processing and analysis techniques: Filtering, aggregation, and AI analysis, to extract meaningful insights from IoT data
Week 13	IoT Applications
Week 14	Case study (Anatomy of a current example enterprise IoT model) / Report presentation (Students group 1)
Week 15	Report presentation (Students group 2)
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Tech students to prepare the environment to implement IoT on their computers and smartphones and smartwatches.
Week 2	
Week 2 – Week 3	Introduction to Mobile programming (Smart phones and watches) and NoSQL data
Week 4 – Week 6	Access the smartphone and smartwatches sensors: Accelerometer, Optical heart rate, GPS, SpO2 monitor, Gyroscope, etc.…
Week 7 – Week 8	Read data from sensors and transfer it to the cloud backend such as Google Firebase real-time database
Week 9 - Week 10	Secure the data transfer
Week 11 – Week 12	Preprocess the data: Cleaning and Aggregation into NoSQL data
Week 13 – Week 14	Process and analysis the data

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Soni, V. (2021). *IoT for Beginners: Explore IoT Architecture, Working Principles, IoT Devices, and Various Real IoT Projects (English Edition)*. BPB Publications.	No
Recommended Texts	Kamal, R. (2017). *Internet of Things: Architecture and Design Principles*	No
Websites	https://www.amazon.com/IoT-Beginners-Architecture-Principles-Projects/dp/9355510063/ref=sr_1_10?crid=1CV8VMMM49KNZ&keywords=IoT&qid=1686613122&s=books&sprefix=iot%2Cstripbooks%2C496&sr=1-10	

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
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Operating Systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	CSC47133				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1 4		**Semester of Delivery**	7	
Administering Department	Computer Science		**College**	College of Science	
Module Leader	Nada A.Z. Abdullah		**e-mail**	Nada.abdullah@sc.uobaghdad.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Nada A.Z. Abdullah and Dr. Mariam Abdulraheem		**e-mail**	Nada.abdullah@sc.uobaghdad.edu.iq Maryam.a@sc.uobaghdad.edu.iq	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CSC11002, CSC11003, CSC23110	**Semester**	1,3
Co-requisites module		**Semester**	1

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	The objectives of this course are: 1. Understanding the fundamental concepts: Students should gain an understanding of the basic concepts and principles that underlie the design and functioning of operating systems. 2. Learning about system structures: Students should learn about the various components and subsystems that make up an operating system, such as process management, memory management, file systems, and device management. 3. Exploring process management: Students should understand how processes are created, scheduled, and managed by the operating system. This includes concepts like multitasking, process communication, and synchronization. 4. Studying memory management: Students should learn about different memory management techniques employed by operating systems to allocate and deallocate memory efficiently. This includes virtual memory, paging, segmentation, and memory protection. 5. Understanding file systems: Students explore the concepts and techniques used by operating systems to organize and manage files. This includes file structure, file operations, and file access control. 6. Gaining knowledge of device management: Students understand how operating systems interact with hardware devices for input/output operations. This includes device drivers, interrupt handling, and device allocation. 7. Examining operating system design principles: Students should learn about the design principles and trade-offs involved in building efficient and reliable operating systems. 8. Developing practical skills: Students gain hands-on experience in working with real-world operating systems through programming assignments and projects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main learning outcomes include: 1. Understanding the fundamental concepts of operating systems: Students learn about the basic components, functions, and services provided by an operating system. 2. Process management: Students gain knowledge of process creation, scheduling, synchronization, and communication mechanisms employed by operating systems. 3. Memory management: Students learn about memory allocation techniques, virtual memory, and memory hierarchy in operating systems. 4. File systems: Students understand how file systems are organized, implemented, and managed, including file organization, access methods, and directory structures.

	5. Device management: Students study how operating systems interact with various I/O devices, including input/output techniques, device drivers, and interrupt handling.
Indicative Contents المحتويات الإرشادية	The common topics that are typically included this course are: 1. Introduction to Operating Systems: - Definition and purpose of an operating system - Evolution and historical development of operating systems - Types of operating systems (e.g., batch, time-sharing, real-time, distributed) 2. Process Management: - Process concept and process control block - Process scheduling algorithms (e.g., FCFS, Round Robin, Priority Scheduling) - Process synchronization mechanisms (e.g., semaphores, mutex) 3. Memory Management: - Memory hierarchy and organization - Virtual memory concept and address translation - Paging and segmentation techniques - Memory allocation strategies (e.g., contiguous allocation, paging, segmentation) 4. File Systems: - File concept and file operations - File organization and access methods - File system implementation techniques - Directory structure and management 5. I/O Systems: - I/O devices and controllers - Device drivers and interrupts - I/O buffering and caching - Disk scheduling algorithms (e.g., FCFS, SSTF, SCAN) 6. Multithreading and Concurrency: - Thread concept and thread states - Thread synchronization mechanisms (e.g., locks, condition variables) - Deadlock prevention and avoidance strategies

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The effective learning strategies for an operating systems course are: etailed Notes: Take thorough and organized notes during lectures to aid i1. Attend Lectures: Regularly attend lectures to grasp the foundational concepts and understand the material presented by the instructor. 2. Take Dn comprehension and review later. 3. Read the Textbook: Read the recommended textbook to gain additional insights, explanations, and examples related to operating systems. 4. Engage in Discussions: Participate in class discussions, group study sessions, or online forums to exchange ideas. 5. Complete Assignments and Projects: Actively engage in practical assignments and projects to apply theoretical concepts and enhance student hands-on skills. 6. Practice with Sample Problems: Solve sample problems and practice exercises provided by the instructor or in the textbook to reinforce student understanding. 7. Utilize Online Resources: Make use of online tutorials, educational websites, and video lectures to supplement student learning and explore different perspectives on the topics. 8. Create Concept Maps or Diagrams: Visualize complex concepts by creating concept maps or diagrams to establish connections and enhance understanding. 9. Form Study Groups: Collaborate with classmates to discuss challenging topics, solve problems collectively, and share different perspectives

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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**	3	10% (10)	3,6 and 9	LO #1, #2 , #3 ,#4,#5 and #6,#7, #8

	Assignments	5	10% (10)	2, 5 ,7, 10, 13	All
	Projects / Lab.	1	15% (15)	Continuous	All
	Report	1	5% (5)	14	All before week14
Summative assessment	**Midterm Exam**	2hr	10% (10)	10	LO #1 - #10
	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 Operating Systems , Definition and purpose of an operating system
Week 2	I/O devices and controllers , Device drivers and interrupts , I/O buffering and caching
Week 3	Types of operating systems (e.g., batch, time-sharing, real-time, distributed)
Week 4	Process concept , process control block, Inter process communication
Week 5	Process scheduling algorithms (e.g., FCFS, Round Robin, Priority Scheduling, SJF, and MQ)
Week 6	Process synchronization
Week 7	Process synchronization mechanisms (e.g., semaphores, mutex)
Week 8	Memory hierarchy and organization
Week 9	Memory allocation strategies (e.g., contiguous allocation, paging, segmentation)
Week 10	Paging and segmentation techniques
Week 11	File system implementation techniques , Directory structure and management
Week 12	File concept and file operations , File organization and access methods
Week 13	Thread concept and thread states
Week 14	Thread synchronization mechanisms (e.g., locks, condition variables)
Week 15	Deadlock prevention and avoidance strategies
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Free Software and Open-Source Operating System
Week 2	Desktop Environment of Linux Operating System.
Week 3	Software and Hardware Management of Ubuntu OS
Week 4	Introduction to Linux Command Line and Virtual Consoles
Week 5	Linux File System Hierarchy
Week 6	Getting Help and Searching Utilities
Week 7	Files and Directories -Working with Files and Directories -Manipulating Files Utilities
Week 8	File and Directory Access Permissions
Week 9	Hard Links vs. Soft Links (Symbolic Links)
Week 10	Retrieving System Information
Week 11	Searching for Files (locate vs. Find) Utilities.
Week 12	Process management - Scheduling Jobs Using the at Command. - Retrieving job output
Week 13	- Listing Pending Jobs - Removing Jobs - Using the Batch Command
Week 14	Standard File Streams -I/O Redirection -Pipes
Week 15	Introduction to Scripting Basic Syntax and Special Characters

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- "Operating System Concepts". Silberschatz, Galvin, Gagne. John Wiley & sons , 10th edition 2018	available in Internet (free)

Recommended Texts	2.Modern Operating Systems 4th Edition by Andrew Tanenbaum , 4th edition 2014	No
Websites	https://www.edx.org/school/linuxfoundation	

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 DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	INFORMATION RETRIEVAL			**Module Delivery**	
Module Type	CORE			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CSC47134				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1 4		**Semester of Delivery**	7	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dunia Fadhel Safo		**e-mail**	dunia.f@sc.uobaghdad.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**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	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CSC24115, CSC36128	**Semester**	4,6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The major objective of an information retrieval system is to retrieve the information – either the actual information or the documents containing the information – that fully or partially match the user's query. It gives the students

	an understanding of the fundamental techniques for hypermedia architectures, design and usability, document management and retrieval, metadata management, and searching the web. Analyze the performance of information retrieval using advanced techniques such as classification, clustering, and filtering over multimedia. Analyze ranked retrieval of a very large number of documents with hyperlinks between them.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the basics of Information Retrieval 2. Realize the data structures like Inverted Indices used in Information retrieval systems. 3. Realize the concepts of agile methods and software testing. 4. Learn the different techniques for compression of an index including the dictionary and its posting list. 5. Developing the ability of develop a complete IR system from Scratch. 6. Understanding the data structures like Inverted Indices used in Information retrieval systems. 7.Understanding the different techniques for compression of an index including the dictionary and its posting list.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A -</u> Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses. Information Retrieval System Capabilities. (12 hrs.) <u>Part B –</u> Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction. Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure. (12 hrs.) <u>Part C:</u> Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.(12 hrs.) <u>Part D :</u> User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext. (13 hrs.)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to understand theoretical concepts through class lectures to introduce various information retrieval methods by explain their objectives , algorithms, and their applications through presentations, and examples. Students are encouraged through doing assignments , homework, and participating the lecture's principles to create an interactive environment. Students are take on tasks that simulate real-life situations to delve into topics deeply and develop practical skills that are valuable beyond the classroom.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**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)	4,7	LO #4,#7
	Assignments	2	10% (10)	4,10	LO #4,#10
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	9	LO #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	13	All
	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 Retrieval • Motivation • Information Retrieval vs Data Retrieval

Week 2	• Models of Information Retrieval
	  ◦ Boolean Model
	  ◦ Vector Space Model
	  ◦ Probabilistic Model
	  ◦ Alternative Models

Week 3	• Retrieval Evaluation
	  ◦ Recall and Precision
	  ◦ Alternative Measures
	  ◦ Reference Collections and Evaluation of IR systems

Week 4	• Query Languages for IR
	  ◦ Keywords
	  ◦ Boolean Queries
	  ◦ Context Queries
	  ◦ Natural Language Queries
	  ◦ Structural Queries

Week 5	dvanced Query Operations • Relevance Feedback • Query Expansion
Week 6	Text Indexing, Preprocessing and File Organization

Week 7	Text Searching
Week 8	Document Clustering
Week 9	Multimedia Information Retrieval • Similarity Queries • Feature-based Indexing and Searching
Week 10	Parallel and Distributed IR • Architectures MIMD and SIMD • Collection Partitioning • Source Selection • Query Processing

Week 11	• Meta-Ranking
	  ○ Integrated vs Isolated Methods
	  ○ Interleaving
	  ○ Voting

Week 12	Web Search
Week 13	Mid-term Exam
Week 14	User Interfaces and Visualization
Week 15	Searching for the metadata that describes data, and for databases of texts, images or sounds.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	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	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Information Retrieval , By Christopher D. Manning, 2008.	Yes
Recommended Texts	Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.	No
Websites	https://nlp.stanford.edu/IR-book/information-retrieval-book.html	

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.

Level-Four (UGIV) Semester Eight

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Data Mining**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CSC48136**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1 forth		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Tareef Kamil Mustafa		**e-mail**	Tareef.mustafa@sc.uobaghdad.edu.iq	
Module Leader's Acad. Title	Professor Assistant		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Mustafa Salman Abd		**e-mail**	Mus.sal.abd@sc.uobaghdad.edu.iq	
Peer Reviewer Name	Dr. Mohammed Ahmed		**e-mail**	Mohammed.dawood@sc.uobaghdad.edu.iq	
Scientific Committee Approval Date	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CSC12009, CSC24115	**Semester**	2,4
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 develop problem solving skills and understanding of Data analysis through the application of techniques. 2. To understand the use of data mining algorithm

	3. This course deals with the basic concept of data mining. 4. Analyze the real life data
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Data analysis through Normalization theory 2. Data mining concepts 3. Data mining algorithms 4. Data warehouse concepts 5. Text mining concepts 6. Analyze real life data using algorithms
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Data mining Theory</u> Data analysis, is a process for obtaining raw data, and subsequently converting it into information useful for decision-making by users. Data, is collected and analyzed to answer questions, test hypotheses, or disprove theories. [8 hrs] Data mining is the process of sorting through large data sets to identify patterns and relationships that can help solve business problems through data analysis. Data mining techniques and tools enable enterprises to predict future trends and make more-informed business decisions. Data mining is a key part of data analytics overall and one of the core disciplines in data science, which uses advanced analytics techniques to find useful information in data sets. At a more granular level, data mining is a step in the knowledge discovery in databases (KDD) process, a data science methodology for gathering, processing and analyzing data. Data mining and KDD are sometimes referred to interchangeably, but they're more commonly seen as distinct things. [14 hrs] data warehouse is a type of data management system that is designed to enable and support business intelligence (BI) activities, especially analytics. Data warehouses are solely intended to perform queries and analysis and often contain large amounts of historical data. [4 hrs] Revision problem classes [4 hrs] <u>Part B – practical lab</u> Fundamentals for programing the data mining algorithm using C++ programing language [20 hrs] Training for using WEKA application to extract results using professional application. [10 hrs]

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 and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**60**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	5 and 10	All
	Assignments	2	5% (5)	2 and 12	All
	Projects / Lab.	1	15% (15)	Continuous	All
	Report	1	10% (10)	12-15	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	First 3 months
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – fundamentals, Theory and Field Theory
Week 2	Data analysis and normalization
Week 3	Implementing normalization algorithm
Week 4	Data mining concepts overview
Week 5	Data mining algorithms and theory
Week 6	Association rule mining algorithm
Week 7	Mid-term Exam
Week 8	Apriori algorithm
Week 9	Naïve Bayesian algorithm
Week 10	k-means clustering
Week 11	Data warehouse fundamentals
Week 12	Data warehouse examples
Week 13	Text mining theory and fundamentals
Week 14	Text mining main parameters
Week 15	Seminars, assignments and reports discussion
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-3	Lab 1: review for C++ programing for data analysis
Week 4-5	Lab 2: initializing tables for data analysis
Week 6	Lab 3: WEKA application usage
Week 7-8	Lab 4: association rule in weka
Week 9-10	Lab 5: Apriori in weka
Week 11-13	Lab 6: Naïve Bayesian in Weka
Week 14-15	Lab 7: practical quiz on computer

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Jiawei Han & Micheline Kamber, (2013),3rd edition "Data Mining: Concepts and Techniques" 2- by Charu C. Aggarwal , "Data Mining: The Textbook", (2015) springer	No
Recommended Texts	Data mining class text book	Yes
Websites	https://www.youtube.com/@dr.tareef	

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 DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Cybersecurity**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CSC48137**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1 forth		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Nada Hussein M. Ali		**e-mail**	nada.husn@sc.uobaghdad.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Mays Mohammed Hoobi		**e-mail**	Mays.m@sc.uobaghdad.edu.iq	
Scientific Committee Approval Date	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CSC36129	**Semester**	6
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. Protection of computer systems and networks from attack by malicious actors that may result in unauthorized information disclosure, theft of, or damage to hardware, software, or data. 2. Analyze and evaluate the cyber security needs of an organization. 3. Conduct a cyber security risk assessment. Measure the performance and troubleshoot cyber security systems. Implement cyber security solutions. 4. Protect the information and systems that support the operations and assets of the agency.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The understanding and knowledge of the core concepts expected of a student at Level 3 2. Develop a broad knowledge of computing as well as specific cyber security expertise and how to put it into practice 3. Learn to use your knowledge of computer systems and networks to protect businesses and users from malicious attacks in computer security modules 4. Study key topics including malware and vulnerabilities, secure coding, sandboxing, virtualization, and ethical hacking and penetration testing techniques 5. Learn practical investigative and 'hacking' techniques
Indicative Contents المحتويات الإرشادية	This course provides a general overview of cybersecurity. Students will be introduced to the concept of cybersecurity governance and the organization's approach to protecting the organization's critical infrastructure from attack, damage, and misuse. Topics include an overview of cybersecurity frameworks; cybersecurity infrastructure; defense techniques, defense tactics and practices; cybersecurity safeguards, and defense in depth. The student evaluation will be as : 1. Oral questions during the theoretical lecture 2. Daily exams in each lecture on the subject of the previous lecture 3. monthly exams

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The first step in building an effective cybersecurity strategy is to perform an internal assessment to understand what cyber threats your business is dealing with today. This includes both external and internal threats; whether they be malware, phishing attacks, ransomware, etc. In addition, the main objective of cyber security is to protect organizations from cyber threats and ensure the confidentiality, integrity, and availability of their data and systems

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60		
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

		Module Evaluation تقييم المادة الدراسية				
		Time/Number	**Weight (Marks)**	**Week Due**	**SWL (hr/week)**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	5% (5)	3 and 12	1	LO #3, #4 and #5, #6 and #7, #8 and #9, #10 and #11, #12
	Assignments	2	5% (5)	2 and 10	1	LO #3, #4,#5 and #7,#8,#9
	Projects	1	10% (10)	Continuous	2.33	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	7 and 15	2	LO #1 - #7 and LO #8 - #14
	Final Exam	3hr	60% (60)	16		All
Total assessment			100% (100 Marks)		6.3 *15 ~ 95(hr/sem) +30 (hr/sem) (theoritical lecture)=125 (hr/sem)	

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Cybersecurity principles
Week 2	Types of Cyberattacks
Week 3	Computer malware
Week 4	Prevention from Cyberattacks
Week 5	Authentication methods
Week 6	Authentication and Password management
Week 7	**Mid-term Exam 1**

Week 8	Viruses types
Week 9	Cloud Computing Security
Week 10	Introduction to web security
Week 11	Steganography • Data Hiding and Extraction • Steganography analysis
Week 12	watermarking
Week 13	Authenticated protocols
Week 14	Digital forensics
Week 15	**Mid-term Exam 2**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the WWW?**
Required Texts	Kutub Thakur and Al-Sakib Khan Pathan, Cybersecurity Fundamentals A Real-World Perspective, 2020 2- Jeetendra Pande, Uttarakhand, Introduction to Cyber Security, Open University 2017. 3- William Stallings, Cryptography and Network Security: Principles and Practice, Sixth Edition, 2014, Pearson Education, Inc	Yes
Recommended Texts	Charles J . Brooks, Christopher Grow, Philip Craig,Donald Short, Cybersecurity essentials, 2018 by John Wiley & Sons, Inc.. 2- The Cyber Security Body of Knowledge, 2019. https://www:cybok:org/	yes

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 DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Introduction to Robotics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**CSC48138**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1 4		**Semester of Delivery**	8	
Administering Department	CSC		**College**		
Module Leader	Rawaa Dawoud Hassan		**e-mail**	rawaa.hassan@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	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CSC35119, CSC47132	**Semester**	5,7
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 develop skills in robot design, construction, and prototyping. 2. Understand robot planning and path optimization algorithms for autonomous navigation. 3. To understand the fundamental principles of robotics, including robot components, sensors, actuators, and control systems. 4. To develop problem-solving and critical thinking skills through hands-on robot projects and challenges. 5. To gain an awareness of current trends and advancements in robotics, such as machine learning, swarm robotics, and humanoids.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Evaluate the impact of robotics in various industries and domains, such as healthcare, manufacturing, agriculture, and space exploration. 2. Design and implement algorithms for robot localization and mapping to enable robots to understand and navigate unknown environments. 3. Understand the principles of machine learning and apply relevant techniques for robot learning, adaptation, and decision-making. 4. Demonstrate knowledge of robotic control architectures and apply appropriate control strategies for different types of robots and tasks. 5. Stay informed about current trends and advancements in robotics and demonstrate an ability to adapt and learn new technologies and methodologies in the field. 6. Critically analyze and discuss ethical and social considerations related to the use of robots in various domains.
Indicative Contents المحتويات الإرشادية	<u>Part A – Introduction to Robotics</u> Definition and history of robotics, Robot components and classifications, Robotic paradigms, Principles of robot mechanical design. [4 hrs.] <u>Part B – Robot Planning and Control</u> Map representations, Path planning algorithms (e.g., A*, Dijkstra's, D*), Dijkstra's algorithm and the multiple start points, Variants of A* algorithm (Beam search, Iterative Deepening A*, Dynamic weighted A*), Analysis of heuristic functions (admissible, consistent, and dominance), Incremental heuristic search, D* Lite algorithm [14 hrs.] Problem decomposition, an example domain: The blocks world, The component of planning system and applying the rules, Planning methods (Planning with state-space search, Goal stack planning). [4 hrs.]

	Part C – Robot Learning and Adaptation Planning and machine learning, Types of machine learning, Reinforcement learning for robot behavior [4 hrs.] Part D – Robot Design and Construction How do robots sense their environment?, Types of sensors, Build a simple circuit for object detection sensor using Arduino, How do robot act in their environment?, Types of motors Build a simple circuit for servo motor control using Arduino. [4 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Here are some learning and teaching strategies that can be employed in this robot course: **1.** Lectures: Traditional lectures can be used to deliver theoretical concepts, principles, and frameworks related to robotics. Lectures can be supplemented with visual aids, demonstrations, and examples to enhance understanding. **2.** Hands-on Lab Work: Practical lab sessions allow students to apply theoretical knowledge by working with robots and programming languages. These hands-on activities provide opportunities for experimentation, troubleshooting, and skill development. **3.** Group Projects: Assigning group projects encourages collaboration, problem-solving, and teamwork. Students can work together to design, build, and program robots to accomplish specific tasks or challenges. This fosters practical application, critical thinking, and project management skills. **4.** Case Studies: Analyzing real-world case studies involving robotics can help students understand the practical applications, challenges, and impact of robotics in various industries and domains. This promotes critical thinking, decision-making, and problem-solving skills. **5.** Guest Speakers: Inviting guest speakers from industry or academia who specialize in robotics can provide valuable insights, industry perspectives, and practical examples. Guest speakers can share their experiences, ongoing research, and advancements in the field. **6.** Robotics Competitions: Organizing or participating in robotics competitions, such as robot sumo, line following, or maze solving, can motivate students and provide a platform to apply their skills in a competitive environment. Competitions promote teamwork, innovation, and strategic thinking.

	7. Online Resources: Curating and providing access to online resources, such as educational websites, tutorials, and research papers, can support self-paced learning and exploration. Online forums and discussion boards can facilitate student engagement and peer learning. 8. Problem-Based Learning: Presenting students with realistic robotic challenges or scenarios and guiding them to identify problems, analyse requirements, and propose solutions fosters critical thinking, creativity, and problem-solving skills. 9. Demonstrations and Field Trips: Organizing demonstrations of advanced robots or arranging field trips to robotics research labs or industrial facilities gives students exposure to cutting-edge technologies, research methodologies, and real-world applications. 10. Assessment Methods: Using a variety of assessment methods, such as written exams, practical demonstrations, project presentations, and reports, allows students to demonstrate their understanding, practical skills, and application of knowledge in different contexts. These strategies aim to engage students actively in the learning process, promote practical application, critical thinking, and collaboration, and provide a well-rounded educational experience in the field of robotics.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

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, #3
	Assignments	2	10% (10)	2 and 12	LO #3, #4
	Project	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #6

Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - What are Robots?, What are Robotic Paradigms?
Week 2	Planning in Robotics – Definition of Path Planning and Path planning algorithms, node relaxation
Week 3	Dijkstra's algorithm, Dijkstra's algorithm and the multiple start points
Week 4	The A* algorithm in path planning
Week 5	Variants of A* algorithm (Beam search, Iterative Deepening A*, Dynamic weighted A*)
Week 6	Analysis of heuristic functions (admissible, consistent, and dominance)
Week 7	Incremental heuristic search - D* Lite algorithm
Week 8	**Mid-term Exam**
Week 9	Planning: Problem decomposition, An example domain: The blocks world
Week 10	The component of planning system and applying the rules, Planning methods (Planning with state-space search, Goal stack planning)
Week 11	Planning and machine learning, Types of machine learning
Week 12	Robot Learning and Adaptation - Reinforcement learning (Q learning) for robot behavior
Week 13	Emerging Trends and Future of Robotics - Cutting-edge research topics in robotics, Emerging technologies in robotics (e.g., soft robotics, bio-inspired robotics), Implications of robotics in healthcare, transportation, and other industries
Week 14	Robot Design and Construction - How does a robot sense its environment? Types of sensors, Build a simple circuit for object detection sensor using Arduino
Week 15	Robot Design and Construction - How does a robot act in its environment? Types of motors, Build a simple circuit for servo motor control using Arduino
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Russell, Stuart and Norvig, Peter. Artificial Intelligence: A Modern Approach. 3: Prentice Hall, 2010.	Yes
Recommended Texts	Spong, Mark W., Hutchinson, Seth, and Vidyasagar, M. Robot Modeling and Control, 2nd Edition: Wiley, 2020.	No
Websites	https://www.edx.org/learn/robotics	

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 DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Multimedia**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**CSC48139**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1 4		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr Ghadah K. Al-Khafaji		**e-mail**	ghada.toma@sc.uobaghdad.edu.iq	
Module Leader's Acad. Title	Prof		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CSC47130	**Semester**	7
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 identify a range of concepts knowledge, techniques, tools for creating and editing the interactive multimedia vital daily applications.

	2- Demonstrate an understanding of the capabilities of current technology and future issues related to multimedia technology in businesses and society along the challenges. 3- To identify both theoretical knowledge and practical processes in designing multimedia systems surrounding the emergence of multimedia technologies with all aspects of text, audio, images and video using contemporary hardware and software technologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, students should be able to: 1- Understand the concepts technologies, and processes which used in design (implementation) and development of multimedia products (solutions). 2- Use active appropriate tools for the design, development and creation of digital media artefacts, concentrate on influence educational improvement through classrooms, and school systems
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Multimedia an overview (basic concept): Defining Multimedia, multimedia elements, mm components representing in computer digital image/audio/video software, animation, user interaction, multimedia interactivity. Typical multimedia computer playback system. Exploring MM on the web .interactivity and Classification of media (the perception medium, the presentation medium). MM applications fields: education, business, entertainment [5 hrs] Part B: Multimedia Software tools - software tools available for carrying out tasks in multimedia are: 1. Music Sequencing and Notation 2. Digital Audio 3. Graphics and Image Editing 4. Video Editing 5. Animation 6. Multimedia Authoring - Multimedia related technology , MM components: Digital image concepts, types, formats in internet , A typical multimedia computer development system [10 hrs] Part C: - Global structure of MM ,Multimedia Storage CD and CD-ROM technology , [5 hrs] Part D: Sound Fundamentals: Basic Sound Concepts (Basic Concept Of Audio), MIDI Basic concepts and devices. [5 hrs]

	Part E: Video Basics , How Video Works, Broadcast Video Standards, Analog video, Digital video, Video Recording and Tape formats, Shooting and Editing Video (Use Adobe Premier for editing), Video Compression and File Formats. Video compression based on motion compensation, MPEG-1, MPEG-2, MPEG-4, MPEG-7, MPEG-21, Animation: Cell Animation, Computer Animation.[5 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies adopted includes smart board, video conferencing, MM applications and educational/commercial tools, exams, projects and seminars

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**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	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**60**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	2% (2)		
	Assignments	2	2% (2)		
	Projects / Lab.	1	30% (30)		
	Report	1	1% (1)		
Summative assessment	**Midterm Exam**	1hr	25% (25)		
	Final Exam	3hrs	40% (40)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Multimedia: introduction to Multimedia, multimedia components digital forms, multimedia interactivity, typical multimedia computer playback system, Hypermedia. Brief history of multimedia, benefits, examples of multimedia, hypermedia, hypertext. differences between these three terms
Week 2	Overview of Multimedia Software tools: for carrying out tasks in multimedia application: 1. Music Sequencing and Notation 2. Digital Audio 3. Graphics and Image Editing 4. Video Editing 5. Animation 6. Multimedia Authoring
Week 3	Continue with the Modality Principle The Multimedia Principle The Coherence Principle Visual Design Principles: Balance, Harmony, Closure, Proximity, Contrast, Color, Alignment, Emphasis Then Exploring multimedia on the web, Classification of media :Perception, Representation, Presentation, Storage, Transmission, Information exchange
Week 4	Multimedia components: Digital image concepts, types, formats in internet, introduction to How to represent digital multimedia components audio , video ,text ,and image data to be processed by computer. *how images and sound are compressed to create smaller files*
Week 5	Global structure of multimedia, Hypermedia and Multimedia
Week 6	Understanding multimedia computer development systems, Web development considerations
Week 7	Color System-number system ,multimedia applications along Functions of Graphics How can we improve multimedia learning? Techniques for Reducing Extraneous Processing Coherence principle Signaling principle Redundancy principle Spatial contiguity principle Temporal contiguity principle
Week 8	Digital camera, Multimedia Storage CD , DVD and CD -ROM technology
Week 9	Sound Fundamentals: Basic Sound Concepts (Basic Concept Of Audio)
Week 10	MIDI Basic concepts and devices
Week 11	Comparison between MIDI and Audio files
Week 12	Video Fundamentals; digitizing video signals , programming video data
Week 13	Introduction to accessing the websites using VB- programming, or VB.Net, C##
Week 14	Power Point Applications in MM that includes Multimedia Learning in Advanced Computer-Based Contexts Multimedia Learning with Animated Pedagogical Agents Multimedia

	Learning in Virtual Reality Multimedia Learning with Games, Simulations, and Microworlds Multimedia Learning with Hypermedia Multimedia Learning in e-Courses
Week 15	Advanced Multimedia Principles Guided-discovery Worked out example Collaboration Self-explanation Animation and interactivity Navigation Site map Prior knowledge Cognitive aging
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1: Lab1	Image Loading, Saving and Manipulations
Week 2:Lab2	Video Loading, Framing and Composition
Week 3:	Video Transitions
Week 4	Image Animation
Week 5	Wave File Reading and Writing
Week 6	Wave File Reading and Writing
Week 7	Text to Voice Conversion+ Simple Web Browser Creation
Week 8	Authoring Tools: Adobe Photoshop
Week 9	Authoring Tools: Adobe Photoshop
Week 10	Authoring Tools: PowerPoint
Week 11	Authoring Tools: SwishMax
Week 12	Authoring Tools: Adobe Sound Auditing
Week 13	Authoring Tools: Windows Live Movie Maker
Week 14	Project Discussion
Week 15	Mid Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Textbook**: - Fundamentals of Multimedia.by **Li**, Ze-Nian, **Drew**, Mark, **Liu**, Jiangchuan 2021,3rd edition ,	No

	Springer International Publishing. DOI: 10.1007/978-3-030-62124-7 Fundamentals of Multimedia.by Ze-Nian Li, and Mark S. Drew. 2014, prentice Hall Mayer, R. (2005). The Cambridge Handbook of Multimedia Learning. New York: Cambridge University Press	
Recommended Texts	*Digital Image Processing Using MATLAB 3rd Ed by Gonzalez, Woods, and Eddins 2020. Gatesmark Publishing*	No
Websites	*1-* http://my.safaribooksonline.com/book/electrical-engineering/9780132442435 2- http://www.slideshare.net/fareedurrahman/multimedia-technologies-introduction 3- http://www.authorstream.com/Presentation/nandinivij1-1757565-lecture-01-introduction-multimedia/	

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 DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Parallel and Distributed Computing**			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	CSC48140				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1 4		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Nada Hussein M. Ali		**e-mail**	nada.husn@sc.uobaghdad.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	6/8/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CSC47133	**Semester**	7
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 covers a broad range of topics related to parallel and distributed computing, including parallel and distributed architectures and systems, parallel and distributed programming paradigms, parallel algorithms, and scientific and other applications of parallel and distributed computing.

	In addition, a selection of topics from the following: the challenges faced in constructing parallel and distributed applications, including testing, debugging and performance evaluation. Various implementation techniques, paradigms, architectures and programming languages including: Flynn's taxonomy, MPI, MapReduce, OpenMP, GPGPU, concurrency and multi-threading.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the requirements for programming parallel systems and how they can be used to facilitate the programming of concurrent systems. 2. To learn and apply knowledge of parallel and distributed computing techniques and methodologies 3. To learn the architecture and parallel programming in graphics processing units (GPUs). 4. Understand the memory hierarchy and cost-performance tradeoffs. 5. To gain experience in the design, development, and performance analysis of parallel and distributed applications 6. Analyze complex problems with shared memory programming with OpenMP.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Distributed Architectures, Socket programming [6 hrs] Part B - Parallel Algorithms, OpenMP [12 hrs] Part C- Message passing interface (MPI) [6 hrs] Part D- Distributed system [9 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	As a result, the ability to develop parallelization strategies for complex processing tasks is a key skill for computer scientists, engineers and mathematical, thus: • Help students understand the distinctive features of a broad range of parallel programming techniques • Show the application of design techniques for solving distributed programming problems • Explain students how to analyses and optimize the performance characteristics of concurrent and distributed architectures • Equip students with necessary mathematical background to prepare them for exposure to more advanced analytical techniques • Enable students to apply taught techniques to solve concrete problems

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**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)	2 , 7, 10	LO #2, #7 and #10
	Assignments	2	10% (10)	2 , 3, 4, 5,14	LO #3 #7 #9 #11 # 13
	Projects / Lab.	no	no	no	no
	Report	1	20% (20)		All
Summative assessment	**Midterm Exam**	2hr	10% (10)		LO #1 to #8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, Parallel and Distributed Computing
Week 2	Parallel and Distributed Architectures, Socket programming
Week 3	Parallel Performance, Shared Memory and Threads
Week 4	Parallel Algorithms
Week 5	Introduction to openmp principles
Week 6	Parallel Algorithms, OpenMP
Week 7	Synchronization, scheduling and task performance
Week 8	Scalable Algorithms, Message Passing
Week 9	**Mid-term Exam**
Week 10	Message passing interface (MPI)

Week 11	Distributed Systems, MapReduce, Clusters
Week 12	Distributed Coordination, Security
Week 13	Distributed File Systems, Security
Week 14	Distributed Shared Memory, Peer-to-Peer
Week 15	fault tolerance, interconnection topologies
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introduction to Parallel Computing, Zbigniew J. Czech, Cambridge University Press, 2016	yes
Recommended Texts	Parallel Programming For Multicore and Cluster Systems Thomas Rauber وGudula R¨unger, Springer-Verlag Berlin Heidelberg 2010	yes
Websites	https://www.openmp.org/	

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.