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

University of Mosul

College of Computer Science and Mathematics

Department of Computer Science

2025

Academic Program Description Form

University Name: University of Mosul

Faculty /Institute: Collage of Computer Science and Mathematics

Scientific Department: Department of Computer Science

Academic or Professional Program Name: Bachelor Science in Computer Science

Final Certificate Name: Bachelor Science in Computer

Academic System: Bolonga Process and Courses System

Description Preparation date: 3/12/2024

File Completion Date: 8/12/2024

Signature

Head of Department Name

Lecturer Dr. Wael Waadallah Mahmood

Date: 5/1/2025

Signature

Scientific Associate Name:

Prof Dr. Safwan Omar Hasoon

Date: 5/1/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Date: 5/1/2025

Signature:

Dr. Ibrahim Muhmmad Ahmad

كلية علوم الحاسوب والرياضيات
جامعة الموصل
مكتب العميد
DEAN OFFICE
University Of Mosul
College of Computer Science and Mathematic

كلية علوم الحاسوب والرياضيات
Quality Assurance

Approval of the Dean

Prof.Dr. Dhuha Basheer Abdullah

5/1/2025

Academic program description form

Reviewing the performance of higher education institutions ((academic program review))

Description of the academic program

This academic program description provides a brief summary of the most important features of the program and the learning outcomes the student is expected to achieve; Demonstrating whether he has made the most of the available opportunities. It is accompanied by a description of each course within the program

1	Educational institution	University of Mosul
2	University department/center	College of Computer Science and Mathematics/Department of Computer Science
3	Name of the academic program	Computer Science
4	Name of the final certificate	Bachelor of Science in Computer Science
5	School system	Bologna System (First Phase and second) Course system (Third and fourth stages)
6	Accredited accreditation program	Academic accreditation(ABET)
7	Other external influences	Central examinations
8	Date the description was prepared	2025

Vision of the Computer Science Department
The department aspires to lead in computer science by developing and utilizing modern technology and computer systems to support scientific progress and enrich society.

Mission of the Computer Science Department
The Computer Science Department seeks to provide high-quality education that aligns with modern technological advancements through updated curricula, advanced practical training, and distinguished scientific research, empowering students to innovate and preparing them for the job market and contributing to sustainable development.

Objectives of the Computer Science Department	
1	Strives to develop curricula that reflect the latest advancements technologies, including artificial intelligence, cybersecurity, the Internet of Things, data analysis, cloud computing, and big data.
2	Seeks to introduce modern programming languages and provide cutting-edge development environments to enhance students' technical capabilities.
3	Focusing on practical aspects in courses through increasing projects and interactive training.
4	Regularly updating computer labs by providing advanced computer hardware and software that pace with technological innovation.
5	Empowering students for the job market by organizing training workshops on the latest technologies and establishing partnerships with local and international companies to provide practical training.
6	Directing graduation projects towards practical solutions for the community.
7	Organizing programming competitions to enhance creativity and innovation.
8	Utilizing cloud computing to streamline access to resources.
9	Implementing modern assessment methods focusing on analysis and problem-solving to enhance practical skills and decision-making and critical thinking skills.
10	Providing a supportive academic environment that encourages students towards excellence and innovation.

Objectives of the academic program

1	Providing students with theoretical and academic knowledge and scientific skills according to the latest scientific findings, as professional and academic cadres that provide society and its institutions with distinguished specialists and various academic qualifications, and strive to increase the number of accepted students after developing and increasing the department's capabilities according to need The labor market and monitoring the educational level through results statistics every year
2	Providing solutions to the problems of state institutions in this regard through the research of graduate students and teaching staff.
3	Keeping pace with modern scientific developments through the research projects of the teachers and focusing on being in the modern fields, especially the applied ones, while not neglecting the academic aspect, including its scientific importance to the department, and following up on this through the research plans prepared annually for the department.
4	Focusing on educational goals through the educational guidance committees in the department linked to the guidance committee in the college and continuous meetings with students to refine their personalities and guide them educationally to solve their problems in a manner consistent with the ethics of our society. All of this is through following up on the committees and their reports that are submitted to the committee in the college and the department presidency.
5	Raising the level of scientific research by holding an annual conference and participating in local, Arab and international conferences.
6	Communicating with modern scientific sources by providing modern books and references from scientific book fairs.

Required learning outcomes and teaching, learning and assessment methods

1	Knowledge and understanding 1. For the student to learn programming languages 2. The ability to find scientific solutions to societal problems programmatically. 3. The ability to use and develop means of communication and wired and wireless networks 4. The ability to analyze and evaluate software systems before starting to design the system. 5. Developing student skills in building smart systems that are based on analysis Inference, reasoning, and self-learning. 6. Providing the student with some basic rules for evaluating and building software systems based on the basics of software analysis. .7Increasing the student's knowledge of the basics of implementing software systems through understanding the mechanism of computer operation.
2	Subject-specific skills 1 .theoretical 2 .practical 3 .Summer training 4 .Graduation research

Teaching and learning methods

1	Ordinary blackboard
2	Smart board
3	Data display device
4	Theoretical, practical, and applied lectures, daily assignments and discussions

Evaluation methods

1	Electronic exams
2	Central and monthly examinations
3	Daily exams
4	Scientific reports
5	Practical exams
6	Research projects
7	Exams, assignments, daily assignments, discussions, laboratory reports, graduation project

Thinking skills

1	The skill of deduction and analysis
2	Comparison skill
3	Discussion skills
4	Skills in using computers and the Internet
5	Research and investigation skill
6	The skill of conducting research and drawing conclusions
7	Decision making skill

Teaching and learning methods

1	Theoretical lectures
2	Practical laboratories
3	Research and investigation
4	Discussion groups within practical lessons
5	Lectures, practical experiments, applications, homework, scientific discussions

Evaluation methods

1	Electronic exams
2	Oral and written examinations
3	Research projects
4	Class discussions
5	Evaluation of assignments and discussions

6	Evaluating individual and group research
7	Exams, assignments, daily assignments, discussions, laboratory reports, graduation project

General and transferable skills (other skills related to employability and personal development)

1	Developing the ability for effective teamwork
2	Developing the ability for self-learning
3	Developing the ability to present and discuss ideas
4	Developing the ability to address problems in a logical, organized manner
5	Ability to work in a multidisciplinary team
6	Ability to communicate and build

Teaching and learning methods

1	Cooperative learning
2	Group discussions
3	Individual learning
4	Lectures, practical experiments, applications, homework, scientific discussions

Evaluation methods

1	Observing students' interaction in different situations
2	Presenting real-life issues and problems and observing how students deal with them programmatically.
3	Evaluating group and individual work
4	Solutions to summer training problems through graduation projects

Academic program

Bologna System - Level 1 and 2

2024-2025

Republic of Iraq - Ministry of Higher Education and Scientific Research

Name of University

Bachelor's degree in }Computer Science (First cycle)

Four years (Eight semesters) - 240 ECTS credits - 1 ECTS = 25 hr

Program Curriculum (2023 - 2024)

جمهورية العراق - وزارة التعليم العالي والبحث العلمي

اسم الجامعة

بكالوريوس في علوم الحاسوب (الدورة الأولى)

أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة اوربية - كل وحدة اوربية = ٢٥ ساعة

المنهاج الدراسي للعام ٢٠٢٣-٢٠٢٤

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)		hr/sem	hr/sem	hr/sem			
UGI	One	1	UoMCS101	Programming Fundamentals	أساسيات البرمجة	English	2	1	2	1			5	89	61	150	6.00	C	
		2	UoMCS102	Logic Circuits Design	تصميم الدوائر المنطقية	English	2	1	2				5	75	75	150	6.00	C	
		3	UoMCS103	System Analysis and Design	تحليل وتصميم النظام	English	3	1			1	1	4	74	76	150	6.00	C	
		4	UoMCS104	Discrete Mathematics	رياضيات متقطعة	English	3	1			1		4	74	51	125	5.00	B	
		5	UoMCS105	Calculus	تفاضل وتكامل	English	3	1			1		4	74	51	125	5.00	S	
		6	UoMCS106	English Language 1	اللغة الانكليزية ١	English	2	1					3	45	5	50	2.00	E	
						Total	15	6	4	1	3	1	25	431	319	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)		hr/sem	hr/sem	hr/sem			
	Two	1	UoMCS107	Advanced Programming	البرمجة المتقدمة	English	2	1	2	1			5	89	61	150	6.00	C	UoMCS101
		2	UoMCS108	Principles of Computer Organization	مبادئ تركيب الحاسوب	English	2	1	2				5	75	75	150	6.00	C	
		3	UoMCS109	Web Programming	برمجة الويب	English	2	1	2				5	75	75	150	6.00	C	UoMCS104
		4	UoMCS110	Principles of Statistics	مبادئ الإحصاء	English	2	1	2				5	75	50	125	5.00	B	
		5	UoMCS111	Democracy and Human Rights	الديمقراطية وحقوق الانسان	Arabic	2	1					3	45	5	50	2.00	E	
		6	UoMCS112	Computer	الحاسوب	English	2	1	2				3	73	2	75	3.00	S	
		7	UoMCS113	Arabic Language 1	اللغة العربية ١	Arabic	2	1					3	45	5	50	2.00	E	
						Total	14	7	10	1	0	0	29	477	273	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)		hr/sem	hr/sem	hr/sem			
UGII	Three	1	UoMCS201	Object Oriented Programming 1	البرمجة الكيانية	English	2	1	2	1			5	89	61	150	6.00	C	
		2	UoMCS202	Database Fundamentals	اساسيات قواعد البيانات	English	2	1	2				5	75	75	150	6.00	C	
		3	UoMCS203	Microprocessors	معالجات	English	3	1			1		4	74	51	125	5.00	C	UoMCS108
		4	UoMCS204	Data Structures 1	هياكل البيانات١	English	2	1	2	1			5	89	61	150	6.00	B	
			UOM2012	Arabic Language 2	اللغة العربية ٢	Arabic	2	1					3	45	5	50	2.00	E	
		5	UoMCS205	Computational Theory	الاحتسابية	English	3	1			1		5	75	50	125	3.00	S	
		6	UOM2050	The Crimes of the Baath System in Iraq	جرائم نظام البعث في العراق	Arabic	2	1					2	44	6	50	2.00	E	
						Total	16	7	6	2	2	0	29	491	309	800	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL	USSWL	SWL	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)		hr/sem	hr/sem	hr/sem			
	Four	1	UoMCS207	Object Oriented Programming 2	البرمجة الكيانية ٢	English	2	1	2	1			5	89	61	150	6.00	C	UoMCS201
		2	UoMCS208	Computer Architecture	معمارية الحاسوب	English	2	1			1		4	60	90	150	6.00	C	
		3	UoMCS209	Distributed Database	قواعد بيانات موزعة	English	2	1	2	1			5	89	61	150	6.00	C	UoMCS202
		4	UoMCS210	Data Structures 2	هياكل البيانات٢	English	2	1	2	1			5	89	36	125	5.00	B	UoMCS204
		5	UoMCS211	Software Engineering	هندسة البرمجيات	English	3	1	2				5	89	36	125	5.00	S	
		6	UOM2022	English language 2	اللغة الإنكليزية ٢	English	2	1					3	45	5	50	2.00	E	
						Total	13	6	8	3	1	0	27	461	289	750	30.00		

Academic Program

Stages third and fourth (course system)

2024-2025

Names of Computer Science Department courses with code, number of credit hours, and number of units

	Course code	Credit hours			Course type	Course Name/English	Course Name/Arabic	Expected number of hours	Number of units
		Discussion	practical	theoretical					
Third year - first semester	CMCS24 F31011	—	2	2	Department Requirement	Compilers (1)	المترجمات (1)	4	3
	CMCS24 F31021	—	2	2	Department Requirement	Database (1)	قواعد البيانات (1)	4	3
	CMCS24 F31031	—	2	2	Department Requirement	Software Engineering	هندسة البرمجيات	4	3
	CMCS24 F31041	—	2	2	Department Elective	Encryption	تشفير	4	3
	CMCS24 F31051	—	—	2	University Elective	Principles of Management	مبادئ الادارة	2	2
	CMCS24 F31061	—	—	3	College Elective	Operation Research	بحوث العمليات	3	3
	Total units								17
Third year - Second semester	CMCS25 F32011	—	2	2	Department Requirement	Compilers (2)	المترجمات (2)	4	3
	CMCS25 F32021	—	2	2	Department Requirement	Artificial Intelligence	ذكاء اصطناعي	4	3
	CMCS25 F32031	—	2	2	Department Requirement	Database (2)	قواعد بيانات (2)	4	3
	CMCS25 F32051	2	—	2	Department Elective	Digital Signal Processing	معالجة الاشارة الرقمية	4	3
	CMCS25 F32061	—	2	2	Department Requirement	Operating System (1)	نظم التشغيل (1)	4	3
	CMCS25 F32071	1	2	2	College Elective	Computer Mathematics	رياضيات حاسوبية	5	3
	CMCS25 F32041	—	—	2	University Elective	English Language (3)	لغة انكليزية (3)	2	2
	Total units								20

	Course code	Credit hours			Course type	Course Name/English	Course Name/Arabic	Expected number of hours	Number of units
		Discussion	practical	theoretical					
Fourth year - First semester	**CMCS24 F41011**	—	2	2	Department Requirement	Operating System (2)	نظم تشغيل(2)	4	**3**
	CMCS24 F41031	—	—	3	Department Requirement	Computer Networks	شبكات الحاسوب	3	**3**
	CMCS24 F41021	—	2	2	Department Requirement	Computer Security	امنية الحاسوب	4	**3**
	CMCS24 F41051	—	—	2	Department Elective	Simulation &Computer Modeling	نمذجة ومحاكاة	2	**2**
	CMCS25 F41041	—	2	2	University Elective	Image Processing	معالجة الصور الرقمية	4	**3**
	CMCS24 F41061	—	4	—	University Elective	Project (1)	مشروع بحث التخرج(1)	4	**2**
	CMCS24 F41071	—	—	2	College Elective	English Language (4)	لغة انكليزية(4)	2	**2**
	Total units								**18**
Fourth year - Second semester	**CMCS25 F42011**	—	2	1	Department Requirement	Networking Lab	مختبر الشبكات	3	**2**
	CMCS25 F42041	—	—	3	Department Elective	Distributed System	نظم موزعة	3	**3**
	CMCS25 F42021	—	2	2	Department Elective	Security Multimedia	امنية وسائط	4	**3**
	CMCS25 F42031	—	—	3	Department Elective	Electronic Commerce	التجارة الالكترونية	3	**3**
	CMCS25 F42051	1	—	2	Department Elective	Information Theory	نظرية المعلومات	3	**2**
	CMCS25 F42061	—	4	—	Department Requirement	Project (2)	مشروع بحث التخرج(2)	4	**2**
	Total units								**15**

Curriculum Skills Map

Please tick the boxes corresponding to the individual learning outcomes of the program that are subject to assessment

Year/Level	Course code	Course name	Module Type	knowledge and understanding				Subject-specific skills				Thinking skills				General, transferable or other skills related to employability and personal development			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
First year	UoMCS101	Object Oriented Programming 1	C	√	√				√			√	√	√		√			
	UoMCS102	Database Fundamentals	C	√										√				√	
	UoMCS103	Microprocessors	C	√				√				√	√	√		√	√		
	UoMCS104	Data Structures 1	B	√				√				√	√	√		√	√		
	UoMCS105	Computational Theory	S					√											
	UoMCS106	The Crimes of the Baath System in Iraq	E					√											
	UoMCS107	Advanced Programming	C		√			√						√		√			
	UoMCS108	Principles of Computer Organization	C	√	√				√			√	√	√		√			
	UoMCS109	Web Programming	C	√					√			√	√	√					
	UoMCS110	Principles of Statistics	B					√											
	UoMCS111	Democracy and Human Rights	E																
	UoMCS112	Computer	S	√				√				√	√	√		√	√		
	UoMCS113	Arabic Language	E	√	√			√	√			√	√	√		√	√		

B→Basic learning activities , C→Core learning activity, S→Support or related learning activity, E→Elective learning activity

Year/Level	Course code	Course name	Module Type	knowledge and understanding				Subject-specific skills				Thinking skills				General, transferable or other skills related to employability and personal development			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Second year	UoMCS201	Object Oriented Programming 1	C	√				√				√	√	√		√	√		
	UoMCS202	Database Fundamentals	C	√															
	UoMCS203	Microprocessors	C	√				√				√	√	√		√	√		
	UoMCS204	Data Structures 1	B					√									√	√	
	UoMCS205	Computational Theory	S	√	√	√	√	√	√										
	UoMCS206	The Crimes of the Baath System in Iraq	E	√	√	√	√	√	√								√		
	UoMCS207	Object Oriented Programming 2	C		√			√	√			√						√	
	UoMCS208	Computer Architecture	C	√				√				√	√	√		√	√		
	UoMCS209	Distributed Database	C					√									√	√	
	UoMCS210	Data Structures 2	B	√	√	√	√	√	√								√		
	UoMCS211	Software Engineering	S	√	√	√	√	√	√								√		
	UoMCS212	English language 2	E	√	√			√	√			√	√	√		√	√		

B→Basic learning activities , C→Core learning activity, S→Support or related learning activity, E→Elective learning activity

Year/Level	Course code	Course name	Core or Elective	knowledge and understanding				Subject-specific skills				Thinking skills				General, transferable or other skills related to employability and personal development			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Third year	CMCS24 F31011	Compilers (1)	Core	√			√	√	√				√	√		√			√
	CMCS24 F31021	Database (1)	Core					√	√			√						√	
	CMCS24 F31031	Software Engineering	Core	√	√			√				√		√		√	√		
	CMCS24 F31041	Encryption	Elective	√		√		√	√			√				√		√	
	CMCS24 F31051	Principles of Management	Elective	√	√							√	√				√		
	CMCS24 F31061	Operation Research	Elective	√	√							√	√				√		
	CMCS25 F32011	Compilers (2)	Core	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	CMCS25 F32021	Artificial Intelligence	Core	√	√			√	√									√	
	CMCS25 F32031	Database (2)	Core	√	√		√	√			√						√		√
	CMCS25 F32041	English Language(3)	Elective					√											
	CMCS25 F32051	Digital Signal Processing	Elective	√				√	√				√	√		√			
	CMCS25 F32061	Operating System (1)	Core	√	√			√	√				√	√				√	√
	CMCS25 F32071	Computer Mathematics	Elective	√	√		√	√	√			√	√	√		√	√		√

Year/Level	Course code	Course name	Core or Elective	knowledge and understanding				Subject-specific skills				Thinking skills				General, transferable or other skills related to employability and personal development			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Fourth year	CMCS24 F41011	Operating System (2)	Core	√	√			√	√				√	√				√	√
	CMCS24 F41031	Computer Networks	Core		√	√		√	√				√	√		√			
	CMCS24 F41021	Computer Security	Core	√	√	√		√	√			√				√		√	
	CMCS24 F41051	Simulation &Computer Modeling	Elective	√				√						√		√		√	
	CMCS25 F41041	Image Processing	Elective	√	√			√	√				√	√		√			
	CMCS24 F41061	Project(1)	Core	√					√			√		√					
	CMCS25 F42011	Networking Lab	Core		√	√		√	√				√	√		√			
	CMCS25 F42041	Distributed System	Elective	√	√			√	√				√	√				√	√
	CMCS25 F42021	Security Multimedia	Elective	√	√	√		√	√			√				√		√	√
	CMCS25 F42031	Electronic Commerce	Elective	√	√			√	√				√	√		√	√	√	
	CMCS25 F42051	Information Theory	Elective	√	√			√	√				√	√		√	√	√	
	CMCS25 F42061	Project(2)	Core	√					√			√		√					
	CMCS24 F41071	English Language(4)	Core	√	√			√	√			√	√	√				√	√

Courses Description

Bologna System - Level 1 and 2
2024-2025

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Programming Fundamentals اساسيات البرمجة			Module Delivery	
Module Type	Core			☒ Theory	
Module Code	UoMCS101			☒ Lecture	
ECTS Credits	6			☒ Lab	
SWL (hr/sem)	150			☐ Tutorial ☒ Practical ☐ Seminar	
Module Level		UGI-1	Semester of Delivery		1
Administering Department		Computer Science	College	Computer Science and Mathematics	
Module Leader	Sedeeq Hasan Albanaa Al-khazraji		e-mail	sedeeq.alkhazraji@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Amera Istiqlal Badran		e-mail	amera_istiqlal@uomosul.edu.iq	
Peer Reviewer Name		Rayan Yousif Yacob	e-mail	rayan@uomosul.edu.iq	
Scientific Committee Approval Date			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	Develop Problem-Solving Skills: Enable students to analyze problems, break them down into smaller components, and design appropriate solutions using a systematic approach. Understand Input-process-output model: understand the input-process-output model. Master C# Programming Fundamentals: Familiarize students with the syntax, data types, control structures, and functions of the C# programming language. Design Algorithms and Flowchart: Teach students how to translate problem-solving strategies into Flowchart and implement it in C#. Software Development Method: Understand the software development method. Enhance Debugging and Troubleshooting Skills: Help students develop effective debugging techniques to identify and resolve errors in their programs. Promote Effective Programming Practices: Encourage good programming habits, such as code documentation, proper naming conventions, and writing readable and maintainable code. Get Exposure to Basic Object-Oriented Programming (OOP) Basics: Introduce students to the principles of OOP, For example: classes, objects, and inheritance. Master Console Application Coding: Develop code writing skills. Prepare for Advanced Programming Courses: Lay the foundation for further studies in computer science and programming by providing a solid understanding of problem-solving techniques and programming fundamentals in C#.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Recognize how read and design algorithms and flowchart. Analyze and break down problems. Practice professional C# programming.

	Debug and troubleshoot C# code. Demonstrate efficient programming skills. Understand basic OOP concepts. Read and write professional C# console applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Problem Solving Problem solving strategies [10 hrs] The role of algorithms in the problem-solving process [20 hrs] Implementation strategies for algorithms [20 hrs] Constructs of C# [20 hrs] Basic syntax and semantics of higher-level language Variables, types, expressions, and assignment Simple I/O Conditional Iterative control structure Data Structures [14 hrs] Representation of numeric data Range, precision. and rounding errors

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures: Use lectures that cover theoretical concepts and provide an overview of key topics. Hands-on Labs: Provide practical lab sessions where students can apply their knowledge and skills acquired in lectures. Use of Technology: Incorporate interactive tools and online platforms for practice and reinforcement. Peer Learning and Collaboration: Encourage students to work together and learn from each other. Scaffolded Learning: Break down complex concepts into manageable parts. Assessment Strategies: Employ a mix of formative and summative assessments. Real-World Examples: Connect theory with practical applications.

	Continuous Learning: Stay updated on computer science advancements and adapt teaching methods. Reflection and Feedback: Encourage self-reflection and provide constructive feedback.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	89	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

As		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
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hrs	10% (10)	7	LO # 1-7
	Final Exam	3 hrs	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to Problem Solving and Programming. Cover course overview and expectations
Week 2	Input-process-output model
Week 3	Algorithm and flowchart design
Week 4	Advanced flowchart and examples
Week 5	Software Development Methods

Week 6	Introduction to C#
Week 7	Mid-term Exam
Week 8	C# Variables
Week 9	Operators in C#
Week 10	If statement in C#
Week 11	Switch statement in C#
Week 12	For loop and nested for loop
Week 13	While and do while loop
Week 14	Operators Precedence
Week 15	Type Conversion
Week 16	Preparatory week before the final Exam

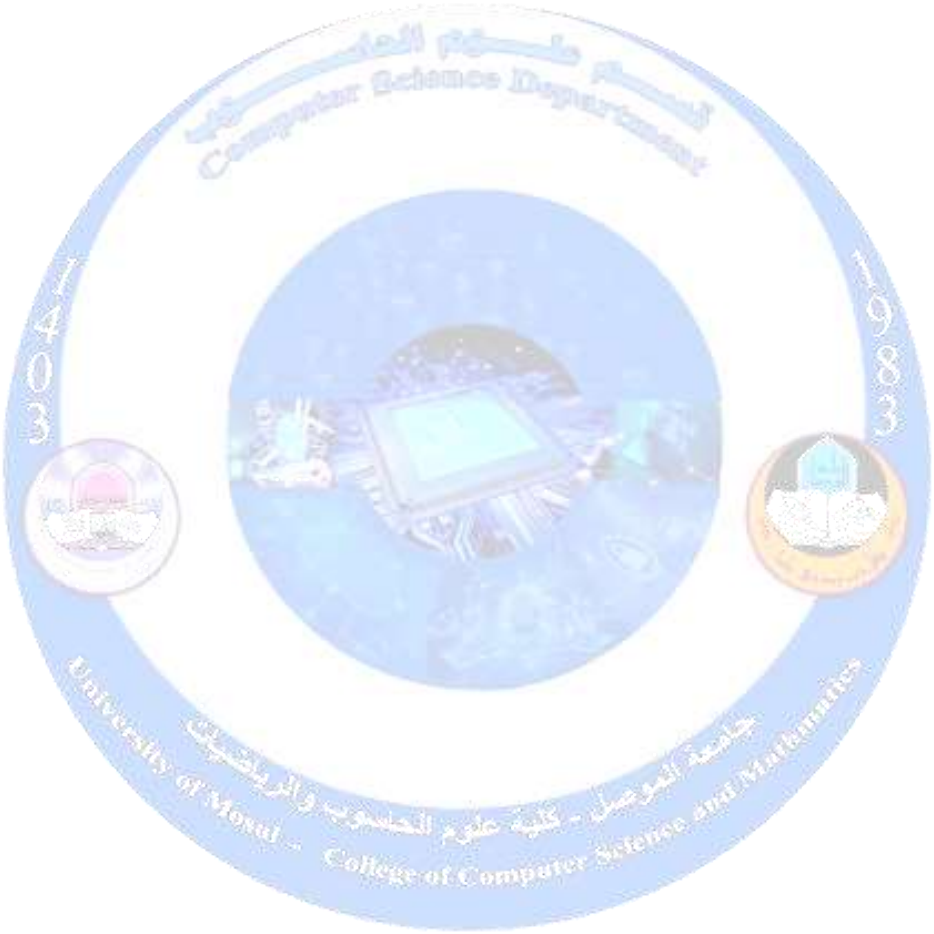
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1	Lab 1: Visual Studio installation
Week 2	Lab 2: Basic printing operations
Week 3	Lab 3: Transfer flowchart to program
Week 4	Lab 4: Writing basic program
Week 5	Lab 5: Program debugging
Week 6	Lab 6: Additional examples
Week 7	Lab 7: Mid-term Exam
Week 8	Lab 8: Programming variables in C#
Week 9	Lab 9: Programming operators in C#
Week 10	Lab 10: Programming If statement in C#
Week 11	Lab 11: Programming switch statement in C#

Week 12	Lab 12: Programming for loop in C#
Week 13	Lab 13: Programming while loop in C#
Week 14	Lab 14: Writing codes about operator precedence
Week 15	Lab15: Additional examples and review
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Paul Deitel Deitel & Deitel Deitel, Visual C# How to Program, 6th edition, Pearson, 2021	Yes
Recommended Texts		
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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Logic Circuits Design تصميم الدوائر المنطقية			Module Delivery	
Module Type	Core			☒ Theory	
Module Code	UoMCS102			☒ Lecture	
ECTS Credits	6			☒ Lab	
SWL (hr/sem)	150			☐ Tutorial ☐ Practical ☐ Seminar	
Module Level		UG I - 1	Semester of Delivery		One (1)
Administering Department		Computer Science	College	Computer Science and Mathematics	
Module Leader	Dr. Amera Istiqlal Badran		e-mail	amera_istiqlal@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	None		e-mail	None	
Peer Reviewer Name		Rayan Yousif Yacob	e-mail	rayan@uomosul.edu.iq	
Scientific Committee Approval Date			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	To learn the basic techniques and methodologies for designing and analyzing digital systems and how to apply these techniques to build specific circuits. Define the problem (Inputs and Outputs), write its functions Implement functions using Combinational digital circuit. Minimize functions using any type of minimizing algorithms (Boolean algebra, Karnaugh-Map or Tabulation Method). Have knowledge in analyzing and designing procedures of Combinational digital circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Learning about the different number systems. Learning the arithmetic operations related to different number systems. Learning the different logic gates of computer system and their work. Ability to design, simplify and implement different logical and arithmetic circuits that considered the basic of digital system. Ability to design, simplify and implement different sequential circuits, counters and shift registers.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Part 1: Different Number Systems, Data representation (integer and fraction) using different number systems. Conversion Between Different Numbers Systems. Arithmetic operations using different number systems, and Digital Codes (BCD, Parity, Gray, Excess-3 ….. etc.) [15 hrs] Part 2 Logic Gates: The Inverter (NOT Gate), AND Gate, OR Gate, NAND Gate, NOR Gate, the Exclusive-OR Gate and Exclusive-NOR Gates, simplification and Boolean Functions, Karnauph Map. [20 hrs] Part 3:

	Digital Circuit Design, Combinational Circuits, Binary Full and Half Adder, Binary Subtractor. [20 hrs] Part 4 Multiplexer and Demultiplexer, Decoder and Encoder, Sequential Circuits, Flip-Flops . [15 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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	75	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
	Quizzes	2	10% (10)	4, 10	LO #1, 2, 3 and 10

Formative assessment	Assignments	2	10% (10)	2, 12	LO # 6, 8, 12 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report				# 4, 5 and 13
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Numbering Systems
Week 2	Arithmetic Operations
Week 3	BCD and Excess 3 Code
Week 4	Logic Gates
Week 5	Simplification and Boolean Functions
Week 6	Karnauph Map
Week 7	Mid Term Exam
Week 8	Digital Circuit Design
Week 9	Combinational Circuits
Week 10	Binary Full and Half Adder
Week 11	Binary Subtractor
Week 12	Multiplexer and Demultiplexer
Week 13	Decoder and Encoder
Week 14	Sequential Circuits
Week 15	Flip-Flops
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1	Lab 1: Logic Gates
Week 2	Lab 2: NOT & AND & OR Gate
Week 3	Lab 3: NOR & NAND gate
Week 4	Lab 4: XOR & XNOR gate
Week 5	Lab 5: Combinational Circuits
Week 6	Lab 6: Adders
Week 7	Lab 7: Subtractor
Week 8	Lab 8: Multiplexer & Demultiplexer
Week 9	Lab 9: Encoder
Week 10	Lab 10 : Decoder
Week 11	Lab 11 : Flops Flip

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Digital Fundamentals, by Floyd Switching Theory and Logic Design, by M. V. Sabramanyam.	Yes
Recommended Texts	Digital Principles and Applications, by Malvino And Leach	No
Websites	https://books.google.iq/books/about/Switching_Theory_and_Logic_Design.html?id=xqXTQwAACAAJ&redir_esc=y	

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	System Analysis and Design النظام تحليل وتصميم			Module Delivery	
Module Type	Core			☒ Theory	
Module Code	UoMCS103			☒ Lecture	
ECTS Credits	6			☐ Lab	
SWL (hr/sem)	150			☒ Tutorial ☐ Practical ☒ Seminar	
Module Level		UGI-1	Semester of Delivery		1
Administering Department		Computer Science	College	Computer Science and Mathematics	
Module Leader	Ban Ghanim		e-mail	ban_ghanm2019@uomousl.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Master
Module Tutor	Name (if available)		e-mail	E-mail	
Peer Reviewer Name		Rayan Yousif Yacob	e-mail	rayan@uomosul.edu.iq	
Scientific Committee Approval Date			Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	Database fundamentals UoMCS202	Semester	3

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The main objectives of the course are as follows: Understanding Systems: The course aims to introduce students to the concept of systems and their role in organizations. Students learn to identify various types of systems, including manual and computer-based systems, and understand their components, relationships, and interactions. System Development Life Cycle: Students are familiarized with the System Development Life Cycle (SDLC), which is a systematic approach to developing information systems. Requirements Gathering and Analysis: Students learn techniques and methods for gathering and analyzing system requirements. System Design: The course focuses on system design principles and methodologies. Students learn to translate user requirements into a conceptual design, create system models and diagrams (e.g., data flow diagrams, entity-relationship diagrams), design user interfaces, and select appropriate hardware and software components. System Implementation: Students gain knowledge about system implementation strategies, including system testing, deployment, and conversion. System Maintenance and Evaluation: The course covers the ongoing maintenance and evaluation of information systems. Students learn about system maintenance activities, such as bug fixing, updates, and enhancements. Project Management: The course may also include project management concepts and techniques, as system analysis and design often involve managing resources, schedules, and budgets.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	a student will be able to: 1. Enhanced problem-solving skills: provide a structured approach to problem-solving, emphasizing critical thinking and analytical skills. 2.Proficiency in system development life cycle (SDLC): System analysis and design courses typically cover the SDLC, which is a standardized process for developing and maintaining information systems. 3.Ability to gather and document requirements: One crucial aspect of system analysis is gathering requirements from stakeholders. 4.Designing efficient and scalable systems: System design involves creating blueprints for software and hardware components, databases, user interfaces, and system architecture.

	5.Improved communication and collaboration: emphasize the importance of effective communication with stakeholders, including users, developers, and project managers. 6.Increased employability: Organizations across various industries require professionals who can analyze, design, and implement effective information systems. 7.Knowledge of emerging technologies: cover emerging technologies and trends in the field. 8.Improved project management skills: touch upon project management methodologies and techniques.
Indicative Contents المحتويات الإرشادية	System Analysis (Introduction) Data vs. Information, Defining A System, System Type System Development Life Cycle, Planning Phase, Analysis Phase, Design Phase, Implementation Phase. [6 hrs.] Systems Development Methodologies Methodology Types, Categories of the System Development Methodologies. [6 hrs] System Planning Phase Project Initiation, System Request, Feasibility Analysis Project Management Project Management, Creating the Work Plan, Staffing The Project. [6 hrs] Information Gathering, Interviews, Joint Application design (JAD), Questionnaire, Document Analysis, Observation. [6 hrs] Process Modeling and Data Flow Diagramming Data flow diagramming (DFD), Using a DFD to Define Business Processes, DFD Levels, Use Case. [6 hrs] Data Modeling Logical data models (LDMs), Physical data models (PDMs), Normalization. [6 hrs.] Design Phase Design phase steps, Design Strategies, selecting a Design Strategy, Moving from Logical to Physical Model. [6 hrs.] Architecture Design

	The Purpose of Architecture Design, Functions (Software) of Architectural Components, Operational Requirements, Performance Requirements Security Requirements, Network Model. [6 hrs.] User Interface Design and Navigation Design User Interface Design Fundamental Parts, Principles for User Interface Design, User Interface Design Process, Basic Principles of Navigation Design. [6 hrs] Data Storage Design Data Storage Formats, Database Types, Optimizing Data Storage. [6 hrs] Program Design Top-Down Modular Approach, Structure Chart, Structure Chart Elements, Building the Structure Chart, Program Specification. [6 hrs] Implementation Phase Construction, Installation, Post – Implementation Evaluation, System Maintenance. [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Assign individual or group projects that involve analyzing and designing systems from start to finish. Break down larger projects into smaller milestones to provide a sense of accomplishment and gradual progress. Provide regular feedback and guidance throughout the project to ensure students stay on track and learn from their experiences. Practical Examples and Case Studies: Utilize real-life case studies to illustrate the application of system analysis and design principles in various industries and contexts. Discuss success stories and challenges faced by organizations during system implementation, highlighting the importance of effective analysis and design.

	Encourage students to analyze and critique existing systems, identifying their strengths, weaknesses, and potential improvements. Collaborative Learning:Foster a collaborative learning environment where students can work together, exchange ideas, and learn from each other's experiences. Incorporate group discussions, peer reviews, and presentations to encourage active participation and knowledge sharing. Assign group projects that require students to work in teams, promoting teamwork and effective communication skills. Continuous Assessment: Conduct regular assessments, quizzes, or exams to evaluate students' understanding of the concepts and principles of system analysis and design. Provide constructive feedback to help students identify their strengths and areas for improvement. Offer opportunities for students to reflect on their learning progress and set personal goals. Stay Updated:

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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

As					
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments				
	Projects	1	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	1 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	System Analysis Fundamentals: Introduction, concepts, Roles of system analyst.
Week 2	Systems Development Methodologies
Week 3	System Planning Phase
Week 4	Project Management
Week 5	Information Gathering
Week 6	Process Modeling and Data Flow Diagramming
Week 7	Mid Term Exam
Week 8	Data Modeling
Week 9	Design Phase
Week 10	Architecture Design
Week 11	User Interface Design and Navigation Design
Week 12	Data Storage Design

Week 13	Designing data
Week 14	Program Design
Week 15	Implementation Phase
Week 16	Final Exam

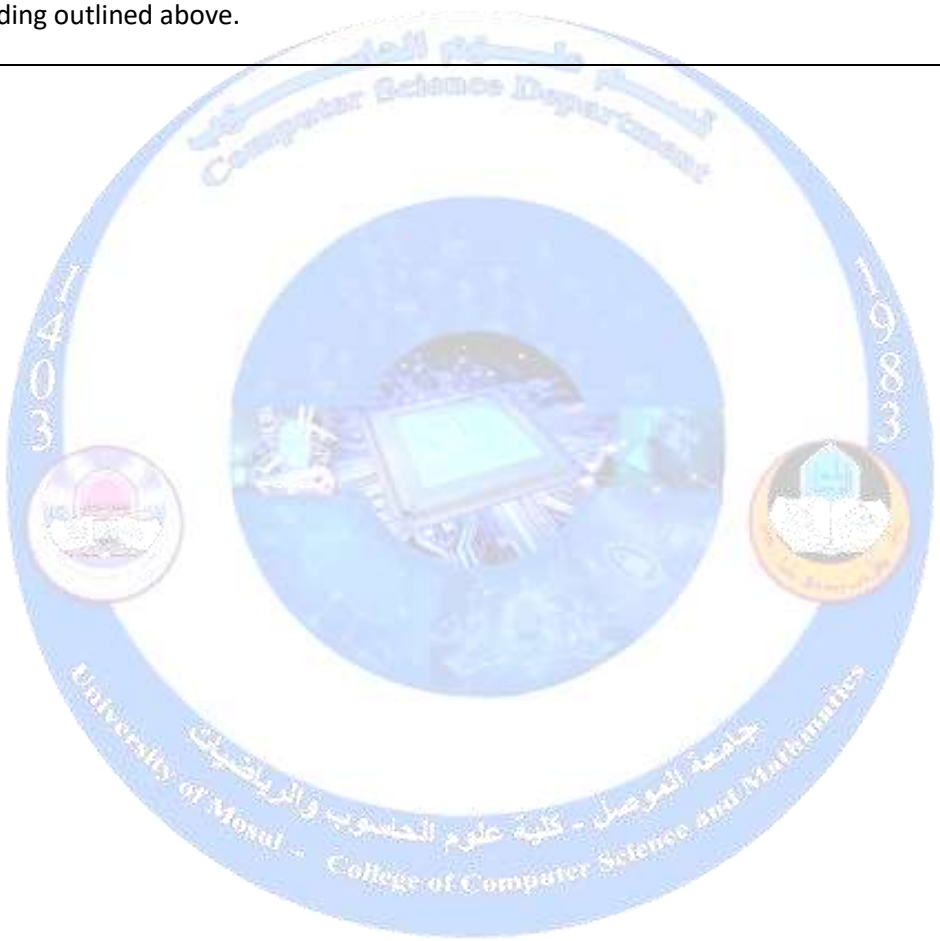
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	No laboratory required

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Systems Analysis and Design – Forth Edition By: Alan Dennis, Barbara Haley Wixom, and Roberta M. Roth, John Wiley & Sons, Inc., 2009	Yes
Recommended Texts	System analysis and design,8th edition By: Alan Dennis, Barbara Haley Wixom, and Roberta M. Roth, John Wiley & Sons, Inc., 2021	No
Websites	https://www.tutorialspoint.com /system analysis and design	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Discrete Mathematics رياضيات متقطعة			Module Delivery	
Module Type	Basic			☒ Theory	
Module Code	UoMCS104			☒ Lecture	
ECTS Credits	5			☐ Lab	
SWL (hr/sem)	125			☒ Tutorial ☐ Practical ☐ Seminar	
Module Level		UGI	Semester of Delivery		1
Administering Department		Computer Science	College	Computer Science and Mathematics	
Module Leader	Dr. Omar Muayad Abdullah		e-mail	omaraldewachy@uomosul.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		Rayan Yousif Yacob	e-mail	rayan@uomosul.edu.iq	
Scientific Committee Approval Date			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	To develop problem solving skills of the fundamentals of discrete mathematics through understanding the concepts of propositional logic. To understand the logical equivalence between tow compound propositions. This course deals with the basic concepts of the concept predicate and quantifiers. To understand the concepts of isomorphism and planar their applications in the real life To understand the concepts of permutations and combinations and how to actually use it.. To understand how to convert any object in the real world into its vertices and edges then we can process it. To understand what the structure of any programming language are through understanding its symbols and strings and all the applied operations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Recognize and understanding the outline of proposition and not proposition terms and their equations and truth table construction. Describe the equations of that satisfies the equivalence logically. Summarize what is meant by converting not propositional logic to proposition through predicate and quantifier. Understanding the graphical representation and contents of the lists . Understanding the tuples representation compared with the lists. Identify how to produce a new string for any language. Identify the algebraic structures with all types. The ability to determine the isomorphism case between two objects. Understanding how to convert any graph to a plane graph. Identify the applications of the combination in the real life. . Understanding the permutation term and its applications.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Propositional logic definition, Compound proposition elements, Compound proposition classification Building a truth table, Logical operators' definition and equivalences in propositional logic, . [10 hrs] Predicate and quantifier concepts, truth values, Universal quantification, Existential quantification, negation operation, object structure, vertices and edges, Functions, injection function, surjection function, bijection, function properties, Domain and co-domain definition, image, and pre-image comparison. [15 hrs] tree definition, m-ary tree , rooted tree, in-order traversal, post order traversal and pre-order traversal. [15 hrs] Definition of lists, graphical representation of list, initializing a list, accessing the values of the list, Tuples construction, applied operations on tuples, [15 hrs] Mechanisms of Strings and Languages construction, isomorphism between two objects, plane graph construction, object segmenting to regions, algebraic structures and permutation and combination analysis [10 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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem)	125		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4,11	LO # 1, 5, 7,9 and 10
	Assignments	5	10% (10)	1,3, 6,10, 12	LO # 2,3, 4, 6 and 8
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 11
Summative assessment	Midterm Exam	1 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Introduction to propositional logic, compound proposition and its classification
Week 2	Logical equivalence concepts
Week 3	Definition of Predicate and Quantifier and their types
Week 4	Definition and types of Functions
Week 5	Introduction to Trees, tree traversal, rooted m-ary tree, vertices, edges, and the outline terminologies
Week 6	Definition of the lists, the graphical representation, operations and programming examples about it
Week 7	Mid-term Exam

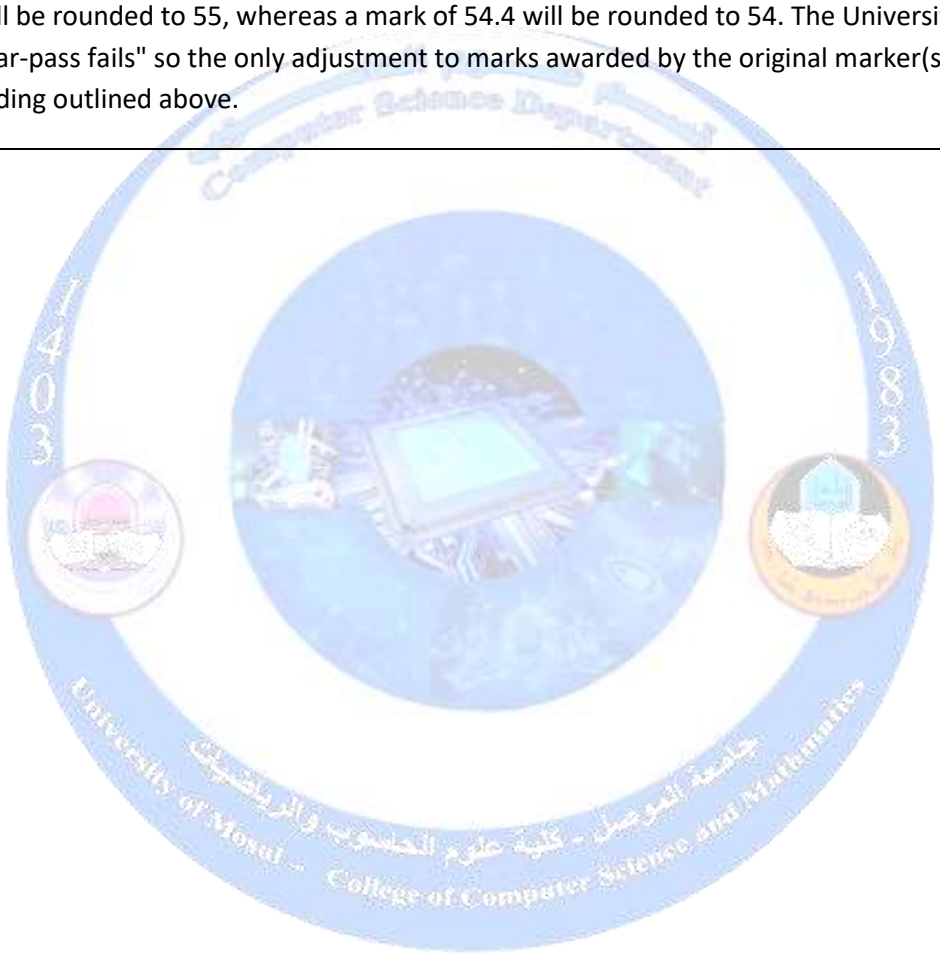
Week 8	Tuples operations, graphical representation, and programming languages examples
Week 9	Strings construction, alphabet symbols, concatenation, and reverse and concatenation operations
Week 10	Language definition, language construction and applied language operations
Week 11	Isomorphism properties, graphs layout, object degree, vertices, edges, and applications
Week 12	Planar, plane graph construction, its properties, plane graph to regions segmentation
Week 13	Algebraic structures, Binary operations on a set, properties and types
Week 14	Permutation definition, n-objects permutation, circle permutation and applications
Week 15	Combination definition, no. of items selection and applications
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Discrete structures , logic and compatibility, James L. Hein, 2017.	Yes
Recommended Texts	Mathematics of discrete structures for computer sciences	No
Websites	https://www.google.iq/books/edition/Mathematics_of_Discrete_Structures_for_C/kYYJLhL2arwC?hl=en&gbpv=0	

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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Calculus / تفاضل وتكامل			Module Delivery	
Module Type	Support			☒ Theory	
Module Code	UoMCS105			☐ Lecture	
ECTS Credits	5			☐ Lab	
SWL (hr/sem)	125			☒ Tutorial ☐ Practical ☐ Seminar	
Module Level	UGx11 1		Semester of Delivery	2	
Administering Department	Type Dept. Code		College	Type College Code	
Module Leader	منى محسن محمد علي فرح حازم محمد		e-mail	Monamoh74@uomosul.edu.iq farahalkadoo@uomosul.edu.iq	
Module Leader's Acad. Title	أستاذ مساعد مدرس		Module Leader's Qualification	Ph.D M.SC.	
Module Tutor			e-mail		
Peer Reviewer Name	منى محسن محمد علي فرح حازم محمد		e-mail	Monamoh74@uomosul.edu.iq farahalkadoo@uomosul.edu.iq	
Scientific Committee Approval Date			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	التعرف على فضاء المتجهات والمفاهيم المتعلقة بها التعرف على الفضاء الجزئي والخواص الجبرية له معرفة التحويلات الخطية وتطبيقاتها
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	فهم وتطبيق مجموعة متنوعة من الأساليب الرياضية: يتعلم الطلاب مجموعة متنوعة من الطرق والأساليب الرياضية المختلفة التي يمكن استخدامها لحل المسائل الرياضية المعقدة. تطوير مهارات التفكير النقدي: يتم تعزيز مهارات التحليل والتركيب والتفكير النقدي عندما يتعلم الطلاب طرقًا رياضية متنوعة. يتم تشجيع الطلاب على التفكير بشكل منهجي والتحليل العميق للمسائل الرياضية. القدرة على حل المسائل الرياضية المعقدة: يتعلم الطلاب كيفية تحليل وفهم المسائل الرياضية المعقدة وتطبيق الأساليب والتقنيات الرياضية المناسبة لحلها بشكل صحيح. التفكير الإبداعي والابتكار: يشجع تعلم طرق رياضية متنوعة الطلاب على التفكير الإبداعي والابتكار في مجال حل المسائل الرياضية. يتعلم الطلاب كيفية تطوير حلول جديدة وفريدة باستخدام الأساليب الرياضية.
Indicative Contents المحتويات الإرشادية	يتضمن المحتوى الارشادي مايلي : فضاء المتجهات والفضاءالجزئي (15 ساعة) التركيب الخطي (15 ساعة) القاعدة والبعد (15 ساعة) فضاء الجداء الداخلي (15 ساعة) التحويلات الخطية (10 ساعة)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	الإستراتيجية الرئيسية التي سيتم تبنيها في تقديم هذه الوحدة هي تشجيع مشاركة الطلاب في التمارين ، وفي الوقت نفسه تقوم بتحسين وتوسيع مهارات التفكير الناقد. سيتم تحقيق ذلك من خلال الفصول الدراسية ، والدروس التفاعلية ، ومن خلال النظر في نوع من التجارب البسيطة التي تنطوي على بعض أنشطة أخذ العينات المثيرة للاهتمام للطلاب.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	130		

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	7 , 12 , 15	LO #1 – 4
	Assignments	3	10% (10)	2 , 6 , 12	LO # 1 , 2 , 3
	Projects / Lab.	0	0	Continuous	
	Report	1	10% (10)	13	LO # 1 , 2
Summative assessment	Midterm Exam	1 hr	10% (10)	11	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	فضاء المتجهات والمبرهنات المتعلقة بها
Week 2	متجه الوحدة والطول
Week 3	الزاوية بين متجهين
Week 4	الفضاء الجزئي والمبرهنات المتعلقة به
Week 5	التركيب الخطي
Week 6	الاستقلال الخطي والتركيب الخطي
Week 7	امتحان يومي
Week 8	القاعدة والبعد
Week 9	فضاء الجداء الداخلي
Week 10	امتحان نصف الكورس الثاني
Week 11	التحويلات الخطية
Week 12	امتحان يومي
Week 13	امثلة على التحويلات الخطية
Week 14	التحويل الصفري والتحويل الذاتي
Week 15	امتحان يومي
Week 16	امتحان نهائي الكورس الثاني

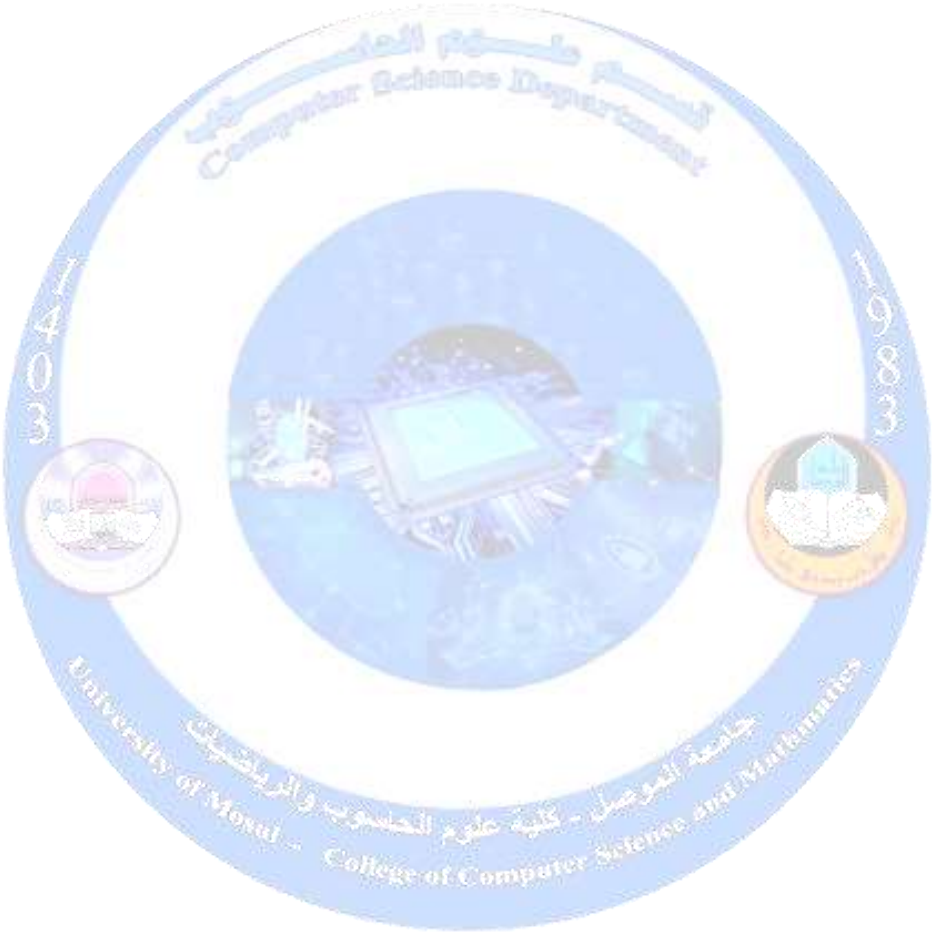
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered

	No Labs

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Stoll .R. R. and Wong .E. T. Linear Algebra, London, 1968. Strang . G., Linear Algebra and Its Application, New York, 2nd ,1980. Mostow . G. D. and Sampson. J .H., Linear Algebra, London, 1969. جورج ضايف السبتي ، الجبر الخطي ، جامعة البصرة – العراق ، 1 ، 1988 . خالد احمد السامرائي وسعد ابراهيم مهدي ، مقدمة في الجبر الخطي ، جامعة بغداد – العراق ، الجزئيين الاول والثاني ، 1989. يحيى عبد الستار ونزار حمدون شكر ، الجبر الخطي ، جامعة الموصل – العراق ، 1 ، 1988.	Yes
Recommended Texts		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

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	English Language 1 اللغة الإنكليزية 1			Module Delivery	
Module Type	Support			☐ Theory	
Module Code	UoMCS106			☒ Lecture	
ECTS Credits	2			☐ Lab	
SWL (hr/sem)	50			☒ Tutorial ☐ Practical ☐ Seminar	
Module Level	UGI		Semester of Delivery	1	
Administering Department	Computer Science		College	Computer Science and Mathematics	
Module Leader	Zainab Qusay Ahmed Taqi		e-mail	Zainab.q@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. lecturer		Module Leader's Qualification	MSc.	
Module Tutor			e-mail		
Peer Reviewer Name	Rayan Yousif Yacob		e-mail	rayan@uomosul.edu.iq	
Scientific Committee Approval Date			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 be able to speak English fluently and accurately. To think in English and then speak. To be able to talk in English. To be able to compose freely and independently in speech and writing. To be able to read books with understanding.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	To address grammar issues that students encounter in their daily speech, writing, reading, and listening. To address the issue of grammatical errors that affect effective communication. To improve your reading skills through the practice of vocabulary enrichment, reading comprehension exercises, speed reading strategies, written responses, discussions, and reflections Recognize the structure and organization of paragraphs, Use strategies to think critically about reading and use appropriate technology to enhance reading comprehension, reading speed, and vocabulary development. Develop the writing skill.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction: about new headway pre-intermediate plus [5 hrs] Tenses: past-present-future, wh- questions. Vocabulary- using a bilingual dictionary, reading (communication). Everyday English (social expressions) [5 hrs] Grammar: Review about tenses, Present tenses, have and have got. Vocabulary: about (daily life), listening and match between verb and nouns. Practices about simple present and present continuous, Reading: about living in the USA. Social expressions about every day English. [10 hrs]

	Past tenses, simple past and past continuous, practice, Reading and listening, regular and irregular verbs. Vocabulary: about N.- V.- Adj. endings. Everyday English (time expressions). [10hrs] Grammar: the quantities, also about Something/someone/somewhere, practices. Reading: about markets, practices. [12 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in developing the four skills: The skill of speaking, The skill of reading, The skill of writing, The skill of listening, Also, enable the students for the use of grammar correctly,

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	44	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	6	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	4,9 and 11	LO #1, #2 and #5
	Assignments	3	10% (10)	2,10 and 13	LO #3, #4 and #6
	Report	1	10% (10)	13	LO #1, #4
Summative assessment	Midterm Exam	1 hr	10% (10)	7	LO #1 - #5
	Final Exam	2 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Introduction: new headway pre-intermediate plus
Week 2	Grammar: Tenses, wh- questions, practices.
Week 3	Vocabulary- how to use a bilingual dictionary, reading about (communication)
Week 4	Everyday English (social expressions), listening, practices.
Week 5	Grammar: Present tenses, have and have got, practices.
Week 6	Vocabulary about (daily life), listening and match between vocabularies, practices.
Week 7	Mid-term Exam.
Week 8	simple present and present continuous, practices, reading about living in the USA.
Week 9	Social expressions about every day English, practices.
Week 10	Grammar: simple past and past continuous tenses, practices.

Week 11	Reading and listening, regular and irregular verbs, practices.
Week 12	Vocabulary: about N.- V.- Adj. endings, practices, Everyday English (time expressions), practices.
Week 13	Grammar: quantity (some, many, any, much, few,….), practice.
Week 14	Grammar: about Something/someone/somewhere, practices.
Week 15	Reading: about markets, practices.
Week 16	Preparatory week before the final Exam

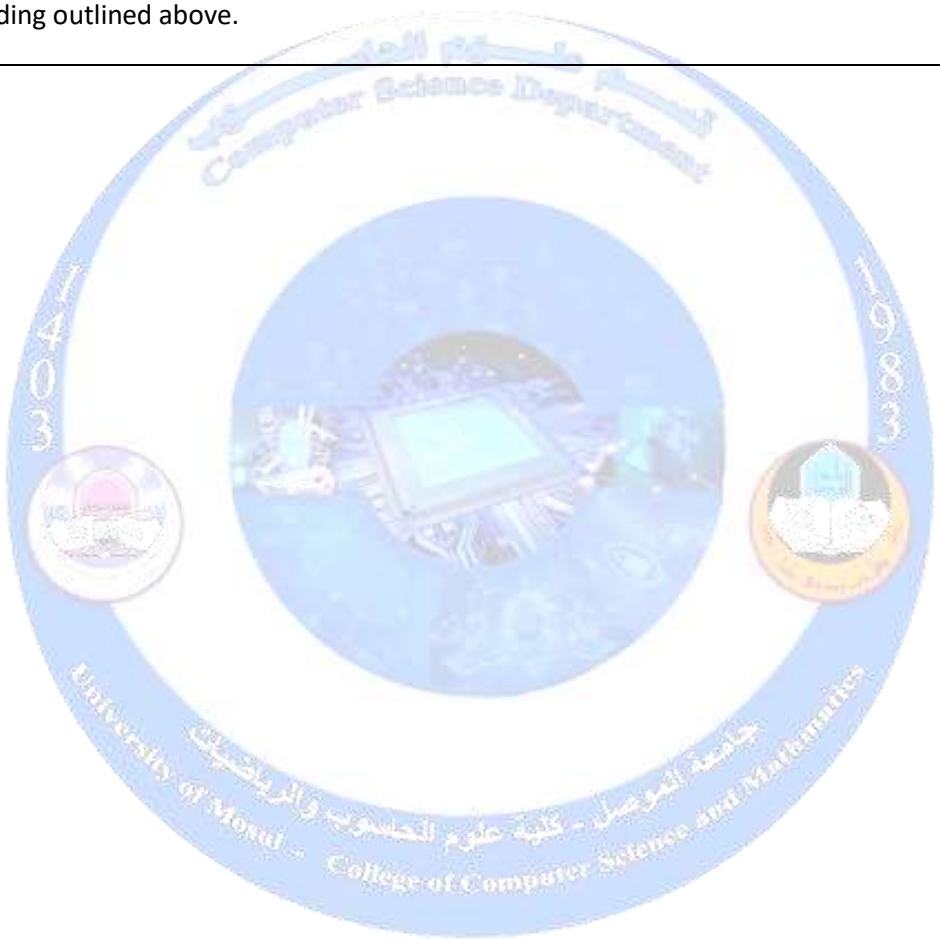
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
	No Labs

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Headway pre-intermediate plus student's book. (John and Liz Soars)	Yes
Recommended Texts	Headway pre-intermediate plus work's book	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	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Advanced Programming** برمجة متقدمة			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**UoMCS107**			☒ **Lecture**	
ECTS Credits	**6**			☒ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level		UGx11 1	**Semester of Delivery**		2
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Sedeeq Al-khazraji		**e-mail**	Sedeeq.Alkhazraji@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Ahmed Salih Hasan	**e-mail**	Ahmed_salih_h@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Programming Fundamentals	**Semester**	1
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. Improve Problem-Solving Skills: Enable students to analyze problems, break them down into smaller components, and design appropriate solutions using a systematic approach. 2. Master Advanced C# Programming: Teach students the advanced data types, control structures, and functions of the C# programming language. 3. Code Modularity Concepts: Teach students how to write modular code using different concepts like functions, libraries, and object-oriented programming principles. 4. Promote Effective Programming Practices: Instill good programming habits, such as code documentation, proper naming conventions, and writing readable and maintainable code. 5. Apply Programming Skills to Real-World Problems: Provide opportunities for students to apply their programming knowledge to solve practical problems and develop software applications. 6. Operating System Programming: Teach student how to connect their program to operating system and how to work with files and directories. 7. Cultivate Collaboration and Teamwork: Encourage students to work collaboratively on programming projects, fostering effective communication, problem-solving, and collaboration skills. 8. Report Writing and Presentation: Prepare the student on how to write the reports and present their work for the class. 9. Decision Making: Communicate design decisions for the selection, storage and manipulation of data 10. Prepare for Future Courses: Prepare students for upcoming courses in the collage, with related to programming.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate problem solving skills. 2. Practice professional C# programming. 3. Summarize code modularity and reusage.

	4. Communicate and Document Code 5. Work collaboratively in teams. 6. Apply programming skills to Real-World scenarios 7. Prepare for future programming concepts.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Arrays [20 hrs] • One dimensional Arrays • Multi-dimensional arrays Functions [20 hrs] • Methods • Calles • Recursive Functions Strings [20 hrs] • Functions to manipulate strings Structures [10 hrs] • ArrayList • Hashtable • SortedList • Stack • Queue • BitArray Pointers [7 hrs] Files [7 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures: Use lectures that cover theoretical concepts and provide an overview of key topics. Hands-on Labs: Provide practical lab sessions where students can apply their knowledge and skills acquired in lectures. Use of Technology: Incorporate interactive tools and online platforms for practice and reinforcement. Peer Learning and Collaboration: Encourage students to work together and learn from each other. Scaffolded Learning: Break down complex concepts into manageable parts. Assessment Strategies: Employ a mix of formative and summative assessments. Real-World Examples: Connect theory with practical applications. Continuous Learning: Stay updated on computer science advancements and adapt teaching methods. Reflection and Feedback: Encourage self-reflection and provide constructive feedback.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	89	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		**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
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Arrays in C#
Week 2	One-Dimensional Array in C#
Week 3	Practical examples about One-Dimensional Array in C#
Week 4	Two-Dimensional Array in C#
Week 5	Practical examples about Two-Dimensional Array in C#
Week 6	Methos in C#
Week 7	**Mid-term Exam**
Week 8	String in C#
Week 9	String built in functions
Week 10	Recursion in C#

Week 11	Files programming
Week 12	File system and directory programming
Week 13	Collections programming
Week 14	Exception Handling in C#
Week 15	Practical examples about and project presentation
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Recap programming basics in C#
Week 2	Lab 2: Programming one-dimensional array in C#
Week 3	Lab 3: Practical examples about one-dimensional array in C#
Week 4	Lab 4: Programming two-dimensional array in C#
Week 5	Lab 5: Practical examples about two-dimensional array in C#
Week 6	Lab 6: Programming methods and method call in C#
Week 7	Lab 7: Mid-term
Week 8	Lab 8: Programming string in C#
Week 9	Lab 9: Programming string built in functions in C#
Week 10	Lab 10: Examples about recursion in C#
Week 11	Lab 11: Examples about files programming in C#
Week 12	Lab 12: Examples about file system and directory programming
Week 13	Lab 13: Collections programming in C#
Week 14	Lab 14: Exception handling in C#
Week 15	Lab 15: Course recap and additional examples C#
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Paul Deitel Deitel & Deitel Deitel, Visual C# How to Program, 6th edition, Pearson, 2021	no
Recommended Texts		
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Principles of Computer Organization** مبادئ ركيب الحاسوب			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	UoMCS108			☒ **Lecture**	
ECTS Credits	**6**			☒ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI 1		**Semester of Delivery**	2	
Administering Department	Computer sciences		**College**	Computer sciences and mathematics	
Module Leader	Alyaa M. Abdul Majeed Haleem		**e-mail**	alyaahaleem@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	MSc.	
Module Tutor	Dhafer Sami Hammadi Marwa jassim Mohammad		**e-mail**	dhafer_un@uomosul.edu.iq marwamaster@uomosul.edu.iq	
Peer Reviewer Name	Ahmed salih hasan		**e-mail**	Ahmed_salih_h@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Logic Circuits Design	**Semester**	1

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. To understand the difference between computer architecture and organization. 2. Describe the different types of computers. 3. To understand the organization of computers and their various units. 4. Describe the bus structures in detail and their interconnections. 5. Describe the input/output interface and devices. 6. Explain the significance of I/O channels and processors. 7. Understand the characteristics of memory systems. 8. Explain memory system design and hierarch 9. Understand the architecture of 8086/8088. 10. Impart the knowledge about the instruction set. 11. To understand the basic idea of data transfer schemes and their applications. 12. Develop Skills in simple program writing for 8086 and applications. 13. To develop problem-solving skills and an understanding of circuit theory through the application of techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, students will be able to: • Demonstrate computer architecture concepts related to the design of modern processors, memories, and I/Os. • Analyze the performance of commercially available computers. • Understand the optimal usage of registers of processors in programming

	• Apply knowledge and demonstrate programming proficiency using the target microprocessor and microcontroller's various addressing modes and data transfer instructions. • demonstrate programming proficiency using the target Arithmetic instruction and logic instructions. • To Develop a report to generate a code for applications using assembly language programming to meet societal requirements.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **UNIT I COMPUTER FUNDAMENTALS** Comparison of Computer Organization &Architecture, Computer Components Functions, Interconnection Structures, basic Operational concepts, Processor Organization and Register Organization, Instruction Cycle, Bus Structures, Input / Output: I/O Module, Von Neumann Architecture, Microprocessors and Microcomputers, General Architecture of a Microcomputer System. [15 hrs] **UNIT II Memory Concepts and Hierarchy** Classification and design parameters, Memory Hierarchy, Multilevel Memory, Internal Memory: RAM, SRAM and DRAM, ROM chips, Interleaved and Associative Memory. Cache Memory, Virtual Memory, External Memory: Magnetic Discs, Optical Memory, Flash Memories. [5 hrs] **UNIT III Processor Organization** Introduction to Microprocessors and Microcomputers, the Software architecture of 8088/8086 microprocessors, Memory Address Space & Data Organization, Assembly Language Programming Development on the PC, Instruction set architecture, Addressing mode, The PC & its DEBUG Program, Examining & Modify the Contents of Memory, Debugging Program (Assemble Command), Data transfer instructions, Arithmetic instructions, Logic Instructions, The Architecture of the Intel 8088/8086 CPU Architecture, Inside the 8086 Microprocessor, Fetch and Execute, Reading/Writing Data. [50 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 discussions, while at the same time refining and expanding their critical thinking skills. This will be achieved through: 1- Lectures - aim to deliver concepts and fundamental knowledge relation.

	2- Tutorial sessions - are deployed to illustrate the application of fundamental knowledge of assembly language programming to different practical problems. 3- Assignments - are arranged to provide the opportunity for students to search for information, analyze problems and model their programs, with knowledge obtained, and present the completed tasks. 4- Computer sessions - to develop actual computer codes to solve simple experiments, and thus the use of assembly language to implement different instructions is an important part of the subject.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	75	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 11	LO # 3 , 4, 9 and 10
	Assignments	2	10% (10)	5, 12,13,15	LO # 4, 11,12 and 14
	Projects / Lab.	1	10% (15)	Continuous	
	Report				
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction To Computer Organization and Architecture, Basic Organization of Computer - CPU Structure, Input-Output Organization
Week 2	Von Neumann Model, Introduction to Microprocessors and Microcomputers, General Architecture of a Microcomputer System
Week 3	Memory System, Basic concepts semiconductor RAMs, read-only memories, Cache memories performance considerations, Virtual memories, secondary storage.
Week 4	System Buses Structure and Expansion Cards, CPU Fetch and Execute cycle
Week 5	The Evolution of Intel X86 Architecture, Software architecture of 8088/8086 microprocessors, Software Model of the 8088/8086 Microprocessor, Memory address space& data organization 8086.
Week 6	Segment Registers and Memory Segmentation, Instruction Pointer, Data Registers, Pointer, and Index Registers.
Week 7	**Mid-term Exam**
Week 8	Status Register, Generating a Memory Address
Week 9	Introduction to Assembly Language Programming, Instruction Set Architecture (ISA), The MOV instruction, 80X86 Addressing Modes
Week 10	80X86 Addressing Modes
Week 11	Data Transfer instructions
Week 12	Arithmetic Instructions
Week 13	Arithmetic Instructions
Week 14	Logic Instructions
Week 15	8088/8086 CPU Architecture, Inside the 8086 Microprocessor, Fetch and Execute, Reading/Writing Data
Week 16	**The preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**

Week 1	Lab 1: The PC & its DEBUG Program
Week 2	Lab 2: Examining & Modify the Contents of Memory (Dump command, Data Entry Commands)
Week 3	Lab 3: Move & compare commands
Week 4	Lab 4: debugging program (assemble command and unassembled command, trace command)
Week 5	Lab 5: General purpose registers, Pointer register & instruction pointer
Week 6	Lab 6: Registers commands & flag register
Week 7	Lab 7: Mid-term Exam
Week 8	Lab 8: Write & execute the program in the debugger by applying MOV inst.
Week 9	Lab 9: Write & execute The Program in the debugger applying MOV inst.
Week 10	Lab 10: Use data transfer instructions in programming
Week 11	Lab 11: Use data transfer instructions in programming
Week 12	Lab 12: Use Arithmetic instruction programming
Week 13	Lab 13: Use Arithmetic instruction programming
Week 14	Lab 14: Use logic instruction programming
Week 15	Lab 15: **The preparatory week before the Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Barry B. Brey, "8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-Bit Extensions Architecture, Programming, and Interfacing", Eighth Edition 2009.	Yes
Recommended Texts	“Computer Organization and Architecture: Designing for Performance”, 10th Edition by William Stallings, Pearson Education, 2016.	No
Websites	https://youtube.com/@alyaahaleem9359	

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	Web Programming برمجة الويب			Module Delivery	
Module Type	Basic			☒ Theory	
Module Code	UoMCS110			☒ Lecture	
ECTS Credits	5			☒ Lab	
SWL (hr/sem)	125			☒ Tutorial ☒ Practical ☐ Seminar	
Module Level		UG I - 1	Semester of Delivery		2
Administering Department		Computer Science	College	Computer Science and Mathematics	
Module Leader	م. عائشة صديق شاهين		e-mail	Aeeshashaheen_1965@uomosul.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		MSc.
Module Tutor	منتهى طارق		e-mail	muntahatariq@uomosul.edu.iq	
Peer Reviewer Name		Ahmed Salih Hasan	e-mail	ahmed_salih_h@uomosul.edu.iq	
Scientific Committee Approval Date			Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Programming Fundamentals	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	HTML (Hypertext Markup Language): HTML is the foundation of web development. Learn the basic structure of HTML, including tags, elements, attributes, and how to create the structure and content of web pages. CSS (Cascading Style Sheets): CSS is used to style and format HTML elements. Learn how to apply styles, change colors, adjust layouts, and make web pages visually appealing. JavaScript: JavaScript is a programming language that adds interactivity to web pages. Start with the fundamentals, such as variables, data types, operators, and control structures. Responsive Web Design: Learn how to create websites that adapt and look good. Understand the concepts of fluid layouts, media queries, and responsive frameworks like Bootstrap.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understanding of Web programming Principles: Learn the fundamentals of web development, including concepts like client-server architecture, HTTP protocol, web standards. Proficiency in HTML: Gain a thorough understanding of HTML and its syntax, allowing to create the structure and content of web pages effectively. Problem-Solving and Debugging Skills: Develop the ability to identify and solve web programming issues, debug code, and troubleshoot common errors. Collaboration: Learn to work collaboratively with other students. Competence in CSS: Develop skills in CSS to style web pages, control layout, and apply visual design concepts to enhance the appearance of websites. JavaScript: Acquire a solid foundation in JavaScript, enabling you to add interactivity, manipulate the Document Object Model (DOM), handle events, and implement dynamic functionality on web pages. Deployment and Hosting: Gain the knowledge to understanding the basics of web hosting. Continuous Learning and Adaptability: Develop a mindset of continuous learning, staying updated with new web technologies, frameworks, and best practices in order to adapt to the evolving field of web programming.
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	Introduction to Web Development [6 hrs] Overview of web technologies Client-server architecture Introduction to HTML, CSS, and JavaScript HTML Fundamentals [30 hrs] HTML structure and syntax Basic HTML tags (e.g., headings, paragraphs, lists) Working with links and images Creating forms and input fields CSS Basics [24 hrs] Introduction to CSS and its role in web design CSS syntax and selectors Applying styles to HTML elements (e.g., colors, fonts, backgrounds) Box model and layout basics JavaScript Cores [10 hrs] Introduction to JavaScript and its role in web programming Variables, data types, and operators Control flow (conditionals and loops) Working with functions and events

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Step-by-Step Tutorials: Provide detailed step-by-step tutorials that guide learners through the process of building web pages. Break down complex tasks into smaller, manageable steps, explaining each step clearly. Interactive Coding Exercises: Incorporate interactive coding exercises that allow learners to practice and experiment with code in a controlled environment. Online coding platforms and interactive coding challenges can be valuable resources for this purpose.

	Pair Programming: Facilitate pair programming, where two learners work together on the same codebase. This promotes collaboration, problem-solving, and sharing of knowledge and ideas. Online Resources and Tutorials: Direct learners to reputable online resources, tutorials, and documentation relevant to web programming. Websites like MDN Web Docs, W3Schools, and tutorials point, offer comprehensive guides and tutorials for beginners. Practice and Repetition: Emphasize the importance of practice and repetition in web programming. Encourage learners to write code regularly, solve coding challenges, and work on mini-projects to reinforce concepts and build coding skills. Hands-on Projects: Encourage learners to work on practical projects right from the beginning. Projects help apply theoretical concepts in a real-world context and provide a sense of accomplishment. Start with small, manageable projects and gradually increase complexity as skills progress. Real-World Examples and Case Studies: Provide real-world examples and case studies that demonstrate how web programming concepts are applied in practical scenarios. This helps learners connect theory to real-world applications. Incremental Learning: Introduce concepts gradually, starting with the basics and building upon them progressively. This helps learners develop a strong foundation and prevents overwhelming them with complex topics too early.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	50	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2 ,5 and 6
	Assignments	4	10% (10)	2, 12	LO # 1,2, 5 and 6
	Projects / Lab.	1	10% (10)	Continuous	
	Report	0	0% (0)		
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-4
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Introduction - The Web Programming,
Week 2	Introduction to HTML, Basic HTML tags and document structure, Creating headings, paragraphs
Week 3	HTML-Attributes and Comments
Week 4	HTML - Tables and lists
Week 5	HTML – Adding images to web pages and working with links and anchors
Week 6	HTML – Forms, Creating forms and handling user input
Week 7	Mid-term Exam
Week 8	Introduction to CSS and its role in web design
Week 9	CSS selectors and the box model
Week 10	Styling text, colors, and backgrounds
Week 11	CSS - Tables
Week 12	CSS – Borders and lists
Week 13	CSS - Text and Image Effects
Week 14	Introduction to JavaScript for web interactivity

Week 15	Handling events and user interactions with JavaScript
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1-2	Lab 1: Basic HTML tags and document structure, Creating headings, paragraphs
Week 3-4	Lab 2: Attributes and Comments, Tables and lists
Week 5-6-7	Lab 3: images and links and forms
Week 8-9	Lab 4: CSS
Week 10-11	Lab 5: CSS continues
Week 12-13	Lab 6: CSS continues
Week 14-15	Lab 7: java

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	HTML, CSS, Bootstrap, Javascript and jQuery, Meher Krishna Patel (2018) Webdeenglish.pdf	No
Recommended Texts	The-complete-reference-html-CSS-fifth-edition, Thomas A. Powell	No
Websites	https://www.tutorialspoint.com/html/html_tutorial.pdf	

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	Principles of Statistics مبادئ الاحصاء			Module Delivery	
Module Type	S			☒ Theory	
Module Code	UoMCS111			☒ Lecture	
ECTS Credits	5			☐ Lab	
SWL (hr/sem)	125			☐ Tutorial ☐ Practical ☐ Seminar	
Module Level		UGI - 1	Semester of Delivery		2
Administering Department			College		
Module Leader	Khairy Badal Rasheed		e-mail	Khairy-stat@uomosul.edu.iq	
Module Leader's Acad. Title		Lecture	Module Leader's Qualification		Msc.
Module Tutor	Shaimaa Waleed Mahmood		e-mail	shaimaa.waleed@uomosul.edu.iq	
Peer Reviewer Name		Ahmed Salih Hasan	e-mail	Ahmed_salih_h@uomosul.edu.iq	
Scientific Committee Approval Date			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	Give the learner the statistical skills that enable him to work in the fields of statistic, calculating measures of statistic. The subject of statistics is a digital language and an art to express the variables and numbers accurately, and thus enables the student to benefit from this subject in the statistics and the programs that are important to him in most fields of life. Statistics course aims to develop ways and means of thinking and how to deal with various problems. Trying to think in sound ways and methods, specifically in solving problems and thus improving and developing society.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understand the fundamental concepts and principles of statistics, including data types, measurement scales, and sampling methods. Interpret and analyze data using descriptive statistical measures, such as measures of central tendency (mean, median, mode) and measures of variability (range, variance, standard deviation). Apply probability theory to analyze and make predictions about uncertain events, including calculating probabilities and understanding the laws of probability. Utilize basic principles of statistical inference to draw conclusions about a population based on sample data, including hypothesis testing and confidence intervals. Apply appropriate statistical techniques for analyzing relationships between variables, including correlation analysis and simple linear regression. Understand and interpret the results of statistical software output and graphical representations. Communicate statistical findings and interpretations effectively, both orally and in written form. Develop critical thinking and problem-solving skills in the context of statistical analysis and interpretation.
Indicative Contents	familiarize students with the basics of statistics, its fields of application. [10 hrs]

المحتويات الإرشادية	the statistical method in scientific research, methods of data collection. [20 hrs] classification and presentation for the purpose of obtaining the necessary information to make appropriate decisions and the possibility of using this data in prediction, in addition to developing students. [10 hrs] skills in research design method. [20 hrs] bringing the student to a level where he has the ability to interpret the results and turn them into a practical reality. [8 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 in the statistical methods.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #4
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Report	1	10% (10)	13	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Definition and importance of statistics
Week 2	Statistical method in scientific research Statistical Notation Types of statistics
Week 3	Data types and methods of collection
Week 4	Types of Samples
Week 5	Frequency distributions (importance and types)
Week 6	Presentation of data Frequency distribution (Tabular presentation)
Week 7	Midterm Exam
Week 8	Cumulative distribution , Graphical presentation
Week 9	Measures of Central tendency for ungrouped data
Week 10	Measures of Central tendency for grouped data
Week 11	Properties of central tendency measures

Week 12	Measures of dispersion (variation) for ungrouped data Measures of dispersion (variation) grouped data
Week 13	Properties of dispersion measurements
Week 14	Pearson and spearman correlation
Week 15	Preparatory week before the final Exam
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1,2	Lab 1: Statistics Level Prac. 1
Week 3,4	Lab 2: Statistics Level Prac. 2
Week 5,6	Lab 3: Statistics Level Prac. 3
Week 7,8	Lab 4: Statistics Level Prac. 4
Week 9,10	Lab 5: Statistics Level Prac. 5
Week 11,12	Lab 6: Statistics Level Prac. 6
Week 13,14,15	Lab 7: Statistics Level Prac. 7

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Elementary Statistics (2007), Allan Bluman.	Yes
Recommended Texts	Basics of Statistics (1995), Jarkko Isolalo.	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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Computer الحاسوب			Module Delivery	
Module Type	Elective			☒ Theory	
Module Code	UoMCS112			☒ Lecture	
ECTS Credits	2			☒ Lab	
SWL (hr/sem)	50			☐ Tutorial ☐ Practical ☐ Seminar	
Module Level	UGI -1		Semester of Delivery	2	
Administering Department	Computer Science		College	Computer Science and Mathematics	
Module Leader	Dr. Basim Mohammed Mahmood		e-mail	bmahmood@uomosul.edu.iq	
Module Leader's Acad. Title	Professor		Module Leader's Qualification	Ph.D.	
Module Tutor			e-mail		
Peer Reviewer Name	Ahmed Salih Hasan		e-mail	ahmed_salih_h@uomosul.edu.iq	
Scientific Committee Approval Date	17/06/2023		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 aims to provide the following: Use computers and devices to carry out Core everyday tasks. Involve students with a variety of operating systems and their peripherals and software. Involve students with office applications. Involve students with multi-purpose applications (e.g., file management, backups, and other related applications). Involve students with the main concepts and configurations of networks. Provide students with the most used web applications and cloud services. Provide students with knowledge related to networks. Present the most frequent security issues related to the regular use of computers and the internet.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students will be able to: Understand the key concepts relating to ICT, computers, devices, and software Identify the different settings and options of an operating system and use the built-in help Recognize good practice in file management and be able to organize files and folders efficiently Understand network concepts and connection options and be able to connect to a network Recognize considerations relating to green IT, accessibility, and user health
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Understand the key concepts relating to ICT, computers, devices, and software. [6 hrs] Identify the different settings and options of an operating system and use the built-in help. [10 hrs]

	Recognize good practice in file management and be able to organize files and folders efficiently. [14 hrs] Understand network concepts and connection options and be able to connect to a network. [8 hrs] Recognize considerations relating to green IT, accessibility, and user health. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy used in this course is to learn students with the most needed computer skills in the job markets aiming to have them more qualified for jobs.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	44	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	6	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
As		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
	Projects / Lab.				

	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	1 hr	10% (10)	7	LO # 1-7
	Final Exam	2 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Introduction to computer skills
Week 2	Computer and devices (hardware and software)
Week 3	Operating systems (Windows, Macintosh, Linux, Unix)
Week 4	Outputs: working with texts using Microsoft office applications (Microsoft Word)
Week 5	Microsoft PowerPoint
Week 6	Microsoft Outlook
Week 7	Midterm Exam
Week 8	Microsoft Excel
Week 9	File Management (Files and folders, storage and compression)
Week 10	Network and Web Principles
Week 11	Network Administration Concepts
Week 12	Protecting Data and Devices
Week 13	Malware and other related security issues
Week 14	Safe use of websites
Week 15	Health and Green IT
Week 16	Final Exam

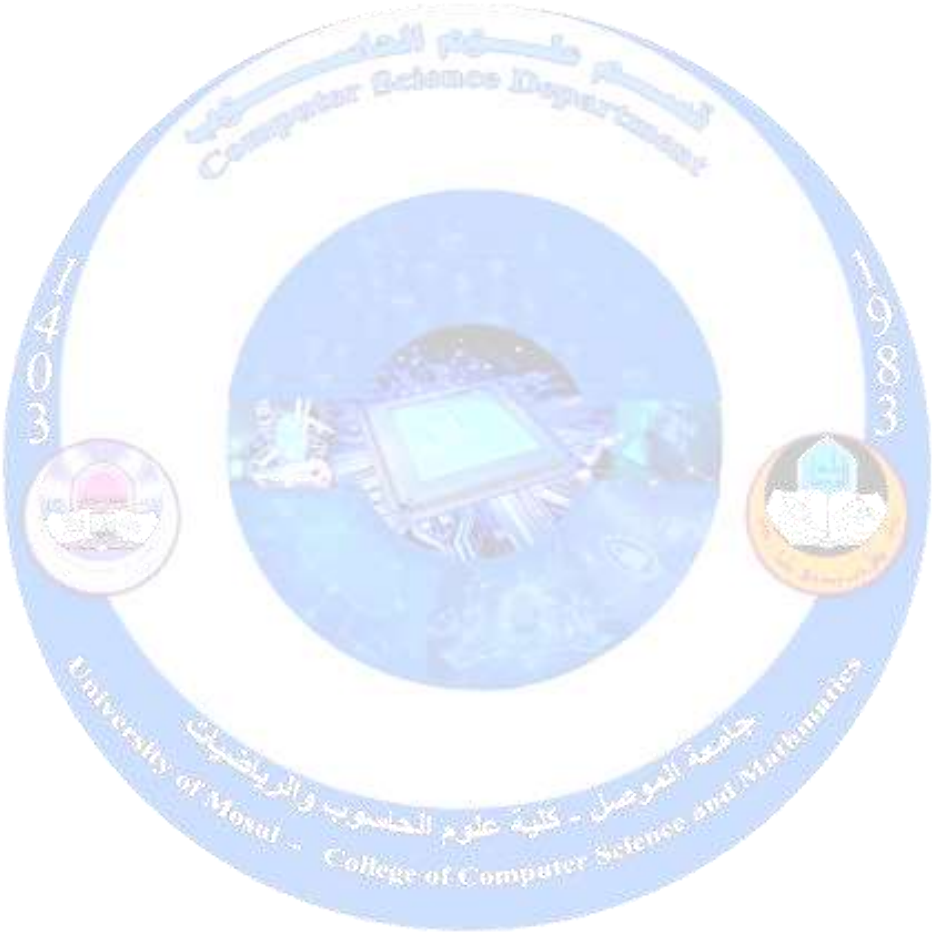
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1,2	Lab 1: Windows and Linux practices
Week 3, 4	Lab 2: Macintosh and Unix practices
Week 5, 6	Lab 3: Microsoft Word
Week 7, 8	Lab 4: Microsoft Outlook
Week 9, 10	Lab 5: Microsoft Excel
Week 11, 12	Lab 6: File management and related applications
Week 13, 14, 15	Lab 7: Network administration, security, and safe use of websites.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	ICDL Online Modules	Online
Recommended Texts	https://icdl.org/workforce/icdl-workforce/	Online
Websites	https://icdl.org/workforce/computer-Cores/	

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	(قيد المعالجة) راسب	(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	**Democracy and Human Rights** الديمقراطية وحقوق الانسان			**Module Delivery**	
Module Type	**Elective**			☒ **Theory**	
Module Code	**UoMCS306**			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level		UGIII	**Semester of Delivery**		Five
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	م.م. عمر دريد ذنون		**e-mail**	Omer.thnon@uomusul.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		M.A.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Haleema Essa solayman	**e-mail**	Haleema_essa@uom.edu.iq	
Scientific Committee Approval Date			**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. توضيح المفاهيم السياسية لدى الطلبة وترسيخ الهوية الوطنية فضلا عن تعزيز القيم المشتركة بين افراد المجتمع الواحد ليمارسوا ادوارهم السياسية ومشاركتهم في الانتخابات مما يسهم في تعزيز الوحدة الوطنية 2. اوان تدريس هذه المادة له اثر كبير في بناء ثقافة المشاركة الواعية واكساب الطلبة مهارة التفكير 3. تعزيز فكرة العدالة الاجتماعية.. 4. تسهم في منح مساحة اكبر للحديث عن الديمقراطية وحقوق الانسان والتنمية السياسية 5. وتتحدث عن الحياة السياسية وتطورها ونشأتها 6. اعتماد اسلوب الحوار والمناقشة ومالمناظرة في تدريسها 7. تعزيز سبل التعليم التفاعلي.. 8. تعزيز **سبل** المشاركة في الشأن العام – المواطنة
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	أ-الاهداف المعرفية تدريس المبادئ الرئيسية للديمقراطية ومصادرها وأنواعها والآليات المستخدمة لحمايتها. اما الجانب السلوكي لابد أن تستهدف مقررات الديمقراطية وترجمة المعارف والخبرات والقيم وأنماط السلوك إلى عمل دائم ونشاط مستمر من أجل الدفاع عنها في الواقع المعاش وتعزيز الجهود الكفيلة بمعالجة قضايا حقوق الإنسان **ب- الأهداف المهاراتية الخاصة بالمقرر** 1.تبني ورعاية وتشجيع صفات التسامح والاحترام والتضامن المتأصلة في الديمقراطية. 2.التعريف بالديمقراطية من بعديها الإقليمي والدولي. 3. تنوير الافراد بحقوقهم الشخصية وغرس احترام الاخرين في نفوسهم . 5.إعطاء العناية الى التنوير بالصلة الوثيقة بين الديمقراطية من جانب والتنمية والسلام بما فيها نزع السلاح من الجانب الاخر ، والحاجة الى اقامة نظام عالمي جديد في الاقتصاد والاجتماع والثقافة لاعانة كل الناس على الاستمتاع بحقوقهم الإنسانية وتطوير ذواتهم. 6.إعطاء تركيز مناسب للحقوق الاقتصادية والاجتماعية والثقافية والمدنية بالإضافة للحقوق السياسية ، وكذلك الحقوق الفردية والجماعية على اعتبار عدم قابلية هذه الحقوق للتقسيم او التجزئة ج- المهارات العامة والتأهيلية المنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي في سبيل: . تعزيز احترام الديمقراطية والحريات الأساس .الإنماء الكامل للشخصية الإنسانية وإحساسها بالكرامة

	تعزيز التفاهم والتسامح والمساواة بين الجنسين، والصداقة بين جميع الأمم والسكان الأصليين والمجموعات العرقية والقومية والإثنية والدينية واللغوية. تمكين كل الأفراد من المشاركة بفاعلية في مجتمع حر
Indicative Contents المحتويات الإرشادية	المدخل للديمقراطية ,التعريف العام للديمقراطية[5 hrs] انواع الديمقراطية ,خصائص النظام الديمقراطي[5 hrs] مميزات النظام الديمقراطي ,اهم الاستنتاجات عن النظام الديمقراطي[5 hrs] المرتكزات الفكرية للديمقراطية ,قياس الديمقراطية , نظرة الاسلاميون للديمقراطية[5 hrs] عناصر النمط الديمقراطي , الاسس العامة للديمقراطية ,عناصر الديمقراطية[5 hrs] المشاركة السياسية , اهم انماط المشاركة السياسية[5 hrs] الانتخابات , شروط الانتخابات وشروط الناخب والمنتخب[5 hrs] التي [5 hrs]اهمية الانتخابات , الرقابة على الانتخابات , النواب والمسؤولية , البرلمان , اهم الصلاحيات يتمتع بها البرلمان الفصل بين [4hrs] المعارضة , مستويات المعارضة , اهداف المعارضة , عناصر تحديد موقع المعارضة , الحكومة والبرلمان

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	محاضرات- ورش عمل - ندوات

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	44	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	6	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2 and 4
	Assignments	2	10% (10)	2, 12	LO # 6
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 3,5
Summative assessment	**Midterm Exam**	1 hr	10% (10)	7	LO # 1-6
	Final Exam	2 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	المدخل للديمقراطية ,التعريف العام للديمقراطية
Week 2	انواع الديمقراطية ,خصائص النظام الديمقراطي
Week 3	مميزات النظام الديمقراطي ,اهم الاستنتاجات عن النظام الديمقراطي
Week 4	المرتكزات الفكرية للديمقراطية ,قياس الديمقراطية , نظرة الاسلاميون للديمقراطية
Week 5	الديمقراطية والشورى , الديمقراطية والرأسمالية
Week 6	عناصر النمط الديمقراطي , الاسس العامة للديمقراطية ,عناصر الديمقراطية
Week 7	مراجعة سريعة , امتحان
Week 8	المشاركة السياسية , اهم انماط المشاركة السياسية
Week 9	الانتخابات , شروط الانتخابات وشروط الناخب والمنتخب
Week 10	صفات الانتخابات , انواع القوانين الانتخابية , طرق الانتخابات
Week 11	اهمية الانتخابات , الرقابة على الانتخابات , النواب والمسؤولية , البرلمان , اهم الصلاحيات التي يتمتع بها البرلمان

Week 12	المعارضة , مستويات المعارضة , اهداف المعارضة , عناصر تحديد موقع المعارضة , الفصل بين الحكومة والبرلمان
Week 13	مبادئ الدستور الديمقراطي , الشروط العامة للديمقراطية ,الحزب السياسي اشكال وانواع الاحزاب السياسية
Week 14	التداول السلمي والشرعي للسلطة ,احترام مبدأ الاغلبية ,الديمقراطية النيابية
Week 15	الامتحان الفصلي
Week 16	مراجعة قبل الامتحان النهائي

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	أ- الكتب الدراسية والمنهجية المقررة من اللجنة العلمية ولجان الاعتماد والأكاديمي .	Yes
Recommended Texts	ب- المحاضرات المؤرشفة من قبل تدريسي الاختصاص لكل مادة ورقية كانت أم فيدوية	No
Websites	ج- مواقع شبكة الانترنت الرسمية المعتمدة من قبل الجامعة .	

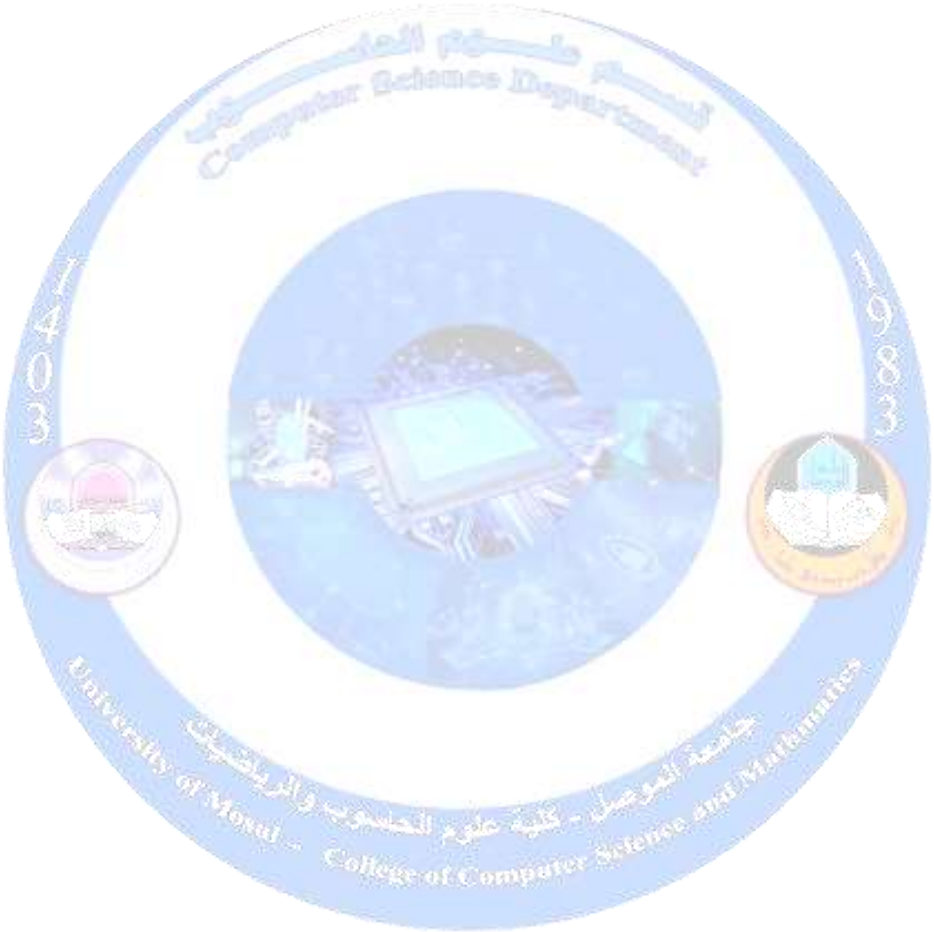
Grading Scheme

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

ملاحظة : سيتم تقريب العلامات العشرية أعلى أو أقل من 0.5 إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال ، سيتم تقريب علامة 54.5 إلى 55 ، في حين سيتم تقريب علامة 54.4 إلى 54. لدى الجامعة سياسة عدم التغاضي "فشل التمرير القريب" لذا فإن التعديل الوحيد للعلامات الممنوحة بواسطة العلامة (العلامات) الأصلية سيكون التقريب التلقائي الموضح أعلاه



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Arabic Language** اللغة العربية			**Module Delivery**	
Module Type	**Elective**			☒ **Theory**	
Module Code	**UoM3CS312**			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Level		UGIII-3	**Semester of Delivery**		6
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	م.م. مروة عدنان اسماعيل		**e-mail**	Loversmewa80@gmail.com	
Module Leader's Acad. Title		Assist. Lecture	**Module Leader's Qualification**		MSc.
Module Tutor	NA		**e-mail**	NA	
Peer Reviewer Name		عائشة صديق	**e-mail**	Aeeshashaheen_1965@uomosul.edu.iq	
Scientific Committee Approval Date			**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-تقوية القدرة اللغوية لدى الطالب وإكسابه مهارة التعبير الصحيح 2- تنمية قدرات الطالب ومهاراته الخطية والاملائية ليتمكن من كتابة البحوث العلمية والتقارير بصورة صحيحة وكذلك يتمكن من استعمال علامات الترقيم ووضعها في المكان المناسب في الجملة , 3- تدريب الطالب على استخدام القواعد النحوية أثناء القراءة والكتابة والتعبير 4- تعويد الطالب على فهم المادة المقروءة والتعبير عنها بلغته الخاصة وذلك مما يشجع الطالب على التفكير والابتكار .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	يتوقع من الطالب بعد إنتهائه من دراسة مادة اللغة العربية تحقيق المخرجات الاتية : 1-معرفة القواعد النحوية 2- معرفة كيفية توظيف ادوات اللغة العربية في كتابة اي بحث علمي 3- تعزيز المحتوى العربي على الشبكة العنكبوتية 4- التعلم الالكتروني واستخدام الحاسوب في التعليم
Indicative Contents المحتويات الإرشادية	مفردات المادة : أهمية اللغة العربية : وهذا الموضوع الاول يتحدث عن اهمية اللغة العربية بصورة عامة مع ربط اعلاقة اللغة العربية بعلم الحاسوب (4 ساعات) اقسام الكلام : وهذا موضوع يقسم الى ثلاثة محاور وهي الاسم والفعل والحرف (8 ساعات) علامات الاعراب : يتحدث عن علامات اعراب الاسم والفعل ويقسم الى محورين علامات الاعراب الاصلية وعلامات الاعراب الفرعية (8 ساعات) المبتدأ والخبر :يتناول مفهوم المبتدأ والخبر واعرابه (6ساعات) كان واخواتها : هذا الموضوع يتعبر تكملة لموضوع الافعال (6ساعات) إن واخواتها : وهي من النواسخ , وهي احرف مشبهة بالفعل (8 ساعات) العدد : وهذا الموضوع مهم جدا لانه يعلم الطالب كيفية كتابة العدد من ناحية التذكير والتأنيث (2 ساعات)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	الطريقة المستخدمة لتعليم الطلاب مادة اللغة العربية هي القاء المحاضرة والشرح بإستخدام السبورة وفي بعض الاحيان نستخدم الداتا شو باستخدام شرائح عرض برنامج البوربوينت (اذا كانت المادة تتطلب لذلك) وكذالك تضمين المحاضرة اسئلة توجه للطلاب لمعرفة مدى فهمهم للمادة , واعطاءهم الواجب البيتي وفي منتصف الفصل يطلب من كل طالب تقرير حول مادة او مفردة معينة , مع الاكثار من الاختبارات اليومية لتساعدهم في حفظ المادة ورفع مستواهم العلمي ايضا .

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	44	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	6	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 3,
	Assignments	3	10% (10)	2, 12	LO # 2, 3, and 4
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 1, 2
Summative assessment	**Midterm Exam**	1 hr	10% (10)	7	LO # 1-3
	Final Exam	2 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	أهمية اللغة العربية
Week 2	علاقة اللغة العربية بعلم الحاسوب
Week 3	أقسام الكلام . الاسم
Week 4	الفعل
Week 5	الحرف
Week 6	علامات الاعراب الاصلية والفرعية
Week 7	**امتحان بالموضوعات (اهمية اللغة العربية وعلاقتها بعلم الحاسوب واقسام الكلام)**
Week 8	علامات الاعراب الفرعية
Week 9	الاسماء
Week 10	المبتدأ والخبر
Week 11	النواسخ
Week 12	كان واخواتها
Week 13	النواسخ
Week 14	ان واخواتها
Week 15	العدد
Week 16	الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**There is no lap in this Module**

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	كتاب النحو الوافي للمؤلف عباس حسن	NO
Recommended Texts	كتاب النحو الشافي للمؤلف محمود حسني وشرح ابن عقيل عن الفية ابن مالك	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

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	**Object Oriented Programming** **البرمجة الكيانية**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**UoMCS201**			☒ **Lecture**	
ECTS Credits	**6**			☒ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level		UGII	**Semester of Delivery**		Three
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	م. زيد عبد الاله منذر		**e-mail**	zaidabdulelah@uomosul.edu.iq	
Module Leader's Acad. Title		Lecture	**Module Leader's Qualification**		Master
Module Tutor	م.م. ياسر علي محمود		**e-mail**	yaser.ali@uomosul.edu.iq	
Peer Reviewer Name		Ruba Talal	**e-mail**	rubatalal@uomosul.edu.iq	
Scientific Committee Approval Date			**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. Abstraction: hiding the implementation details and showing only functionality to the user. 2. Encapsulation: data hiding. 3. Polymorphism: the ability to take more than one form. 4. Inheritance: objects of one class acquire the properties of objects of another class.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Codes basic programs in C# programming language 2. Uses objects and classes 3. Lists the object-oriented programming concepts 4. Declares objects and classes 5. Distinguishes classes and objects 6. Declares and uses variables 7. Declares and uses methods and properties 8. Explains and uses encapsulation 9. Explains and uses inheritance 10. Explains and uses polymorphism 11. Explains and handles exceptions 12. Describes exceptions 13. Throws exceptions 14. Catches exceptions
Indicative Contents المحتويات الإرشادية	Basics of C# [6 hrs] Characteristics of Object-Oriented Programming [6 hrs] Classes and Objects [10 hrs]

	Working with Constructors Data Members [12 hrs] Using Static Variables & Understanding Scope [12 hrs] Overloading [15 hrs] Inheritance [10 hrs] Exceptions and Errors [13]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Some of the popular teaching and learning strategies will be used in this class. Visualization, Teamwork and Inquiry-Based Teaching are examples of some of these strategies. Encourage students' participation in the exercises also will be considered.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	89	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		**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

	Projects / Lab.				
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Getting Started with C#
Week 2	Understanding C# Programs
Week 3	Characteristics of Object-Oriented Programming
Week 4	Classes and Objects
Week 5	Constructors
Week 6	Working with Data Members
Week 7	**Midterm Exam**
Week 8	Overloading Methods & Constructors
Week 9	Reusing Existing Code with Inheritance
Week 10	Reusing Existing Code with Inheritance
Week 11	Reusing Existing Code with Inheritance
Week 12	Polymorphism, Interfaces and Operator Overloading
Week 13	Polymorphism, Interfaces and Operator Overloading
Week 14	Exceptions and Errors
Week 15	Exceptions and Errors
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1,2	Lab 1: First experiment (Write first program in C#)
Week 3,4	Lab 2: Second experiment (Constructors)
Week 5,6	Lab 3: Third experiment (Overloading Methods & Constructors)
Week 7,8	Lab 4: Fourth experiment (Reusing Existing Code with Inheritance)
Week 9,10	Lab 5: Fifth experiment (Polymorphism, Interfaces and Operator Overloading)
Week 11,12	Lab 6: Sixth experiment (Exceptions and Errors)
Week 13,14,15	Lab 7: seventh Experiment (It incorporates all the skills learned during the laboratories)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Microsoft Visual C# 2017 : An Introduction to Object-Oriented Programming, Seventh Edition	No
Recommended Texts	Sams Teach Yourself the C# Language in 21 Days	No
Websites		

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	**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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Database Fundamentals** اساسيات قواعد البيانات			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**UoMCS202**			☒ **Lecture**	
ECTS Credits	**6**			☒ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level		UGII-2	**Semester of Delivery**		3
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	Ammar Thaher Yaseen		**e-mail**	ammarthaher@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Maison Khadir Husain		**e-mail**	maisonkhadir@uomosul.edu.iq	
Peer Reviewer Name		RubaTalal	**e-mail**	rubatalal@uomosul.edu.iq	
Scientific Committee Approval Date			**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. To develop data analyzing skills. 2. To understand database principles and its application fields. 3. This course deals with the basic concept of database systems. 4. This is the basic subject for all database systems and their applications. 5. To understand database management system and database models. 6. To perform one of a database system project.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize general definitions of database and its characteristics. 2. List the roles of database management systems. 3. Summarize the data independence characteristic in database systems. 4. Discuss the views of the database system 5. Describe Conceptual, logical, physical levels of database system. 6. Define Network architecture and database system. 7. Identify general view of Entity Models. 8. Discuss candidate keys and focus on Primary Key.

	9. Explain basics Entity-Relational model. 10. Discuss Normalization and Normal Form. 11. Identify the basic concepts of Relational Algebra. 12. Discuss ACID properties and Transactions. 13. Discuss 12 Codd's roles. 14. Revise the database principles.
Indicative Contents المحتويات الإرشادية	<u>Part A – Database Principles</u> Database and database management definitions, DBMS components, Database system elements, Database applications, Differences between file system and database system. [15 hrs] <u>Part B – Database Models</u> Hieratical Database Model, Network Database Model, Relational Database Model, Distributed Database, Data Warehouse. [10 hrs] <u>Part C – Entity-Relationship Diagram</u> Entity definition, Entity properties, Properties types, Relationship definition, Relationship constraints. [15 hrs] <u>Part D – Relational Model and Normalization</u> Entity-Relationship movement to Relational Model. Entity to Table, Properties to columns. [15 hrs] <u>Part E –Relational Algebra</u> Unary and Binary Operation, Selection, Projection, Union, Intersection, Difference, Join. [10 hrs] <u>Part F – ACID Properties</u>

	Transaction definition, Atomicity, Consistency, Isolation, Durability, 12 Codd rules. [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 project and by considering type of simple experiments involving some quizzes activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	75	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	2,6	LO #1 and 5
	Assignments	1	10% (10)	12	LO # 2,3,4,6-14

	Projects / Lab.	1	10% (10)	Continuous	
	Report				
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	General definitions of database and its characteristics.
Week 2	The roles of database management systems.
Week 3	Data independence characteristic in database systems.
Week 4	Views of the database system.
Week 5	Conceptual, logical, physical levels of database system.
Week 6	Network architecture and database system.
Week 7	Mid-term Exam.
Week 8	General view of Entity Models.
Week 9	Entity properties.
Week 10	Candidate keys and focus on Primary Key.
Week 11	Basics Entity-Relational model.
Week 12	Normalization and Normal Form.
Week 13	Basic concepts of Relational Algebra.
Week 14	ACID properties and Transactions.
Week 15	12 Codd's roles.
Week 16	Preparatory week before the final Exam.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1,2	Lab 1: Install SQL Server, Structure of SQL language, create, update, remove tables
Week 3,4	Lab 2: Add, read, update, remove from tables
Week 5,6	Lab 3: Create synonym, views, sequence of tables, use functions, triggers, cursors
Week 7,8	Lab 4: Install C#, create Forms, add buttons, textbox, label, add programs to buttons
Week 9,10	Lab 5: Connect SQL-Server to C#, display table records from DB via C# forms
Week 11,12	Lab 6: Add table records of DB via C# forms, update table records of DB via C# forms,
Week 13,14,15	Lab 7: Preparatory week before the final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Modern Database Management Systems, Fred R. McFadden, 10th ed, Addison –Wesly, 2015	Yes
Recommended Texts	Database system concepts, by Silberschatz, Korth and Sudarshan, 7th ed, McGraw-Hill, 2019.	No
Websites	https://hevodata.com/learn/database-systems/	

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microprocessors** **معالجات**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**UoMCS203**			☒ **Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level		UGII	**Semester of Delivery**		Three
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	Dr.Wael Wadullah Mahmood		**e-mail**	wael.hadeed@uomosul.edu.iq	
Module Leader's Acad. Title		Lec.	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Ruba Talal	**e-mail**	rubatalal@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	UoMCS108	**Semester**	2
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. Understand the architecture of the 8086 microprocessor 2. Learn assembly language, and write programs in assembly 3. Learn memory and Input/Output interfacing techniques 4. Understand the function and use of interrupts in a microprocessor system
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Have a clear understanding of the microprocessor terminology. 2. Be able to use the assembly language to develop and write programs that use different data types. 3. Have knowledge of x86 Microprocessor architecture and 8086 Hardware specifications. 4. Have knowledge of different microprocessor mechanisms and techniques such as Memory and I/O interfacing, Stack Operations, BIOS and MS-DOS Interrupts. 5. Be able to use different microprocessor mechanisms and techniques such as Memory and I/O interfacing, Stack Operations, BIOS and MS-DOS Interrupts. 6. Be able to understand the documentation for, and make use of the Assembly library 7. Prepare and deliver coherent and structured verbal and written technical reports.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Introduction to the microprocessor</u> 8086 µp architecture (Review to the computer organization course) [5 hrs] 8086 Internal architecture [10 hrs] 8086 Pin diagram; Multiplexed Pins [5 hrs]

	8086 Pin diagram; Shared Pins in the two 8086 modes [10 hrs] 8086 Pin diagram; Minimum Mode 8086 Pins [5 hrs] 8086 Pin diagram; Maximum mode 8086 Pins [5 hrs] <u>Part B - 8086 Instruction set: Microprocessor Programming</u> Bit Manipulation Instructions [10 hrs] String Instructions, Branch Instructions, Program control Instructions. [5 hrs] Interrupts in 8086; Review, Interrupts in 8086; Special interrupts, Interrupts in 8086; special cases in interrupts . [10 hrs] How to write assembly program [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The ablity to working effectively alone or as a member of a small group working on some programming tasks. Use the scientific literature effectively.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.1

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150

Module Evaluation

تقييم المادة الدراسية

As		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
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to the microprocessor
Week 2	Basics of microprocessor
Week 3	x86 Microprocessor architecture
Week 4	8086 Hardware specifications
Week 5	Assembly Language Fundamentals: Defining Data, Symbolic Constants
Week 6	x86 Memory Management: Addressing Modes

Week 7	**Mid-term Exam**
Week 8	8086 Instruction set: Microprocessor Programming
Week 9	Data-Related Operators and Directives
Week 10	Data Transfers, Addressing, and Arithmetic
Week 11	Memory and I/O interfacing
Week 12	Stack Operations
Week 13	Conditional Processing: Boolean and Comparison Instructions
Week 14	Procedures: Defining and Using Procedures
Week 15	BIOS and MS-DOS Interrupts: Direct memory access
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
	No Labs

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Godse, Atul P., and Deepali A. Godse. Microprocessors & Microcontrollers. Technical publications, 2021.	No
Recommended Texts	The Intel microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro processor, Pentium II, Pentium III, and Pentium 4 , and Core2 with 64-bit extensions: architecture, programming, and interfacing, Barry B. Brey, 8th ed., Pearson / Prentice Hall, 2009.	Yes
Websites	http://www.dailyfreecode.com/Tutorial_Page10/Assembly_Language-49.aspx	

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	**Data Structures** هياكل البيانات			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	**UoMCS204**			☒ **Lecture**	
ECTS Credits	**5**			☒ **Lab**	
SWL (hr/sem)	**125**			☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level		UGII-2	**Semester of Delivery**		3
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	Ban Sharief Mustafa		**e-mail**	Banmustafa66@uomosul.edu.iq	
Module Leader's Acad. Title		Associate Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Ruba Talal	**e-mail**	rubatalal@uomosul.edu.iq	
Scientific Committee Approval Date			**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. Develop a comprehensive understanding of fundamental data structures and their practical applications in programming. 2. Gain proficiency in implementing and manipulating data structures, including arrays, linked lists, stacks, queues, trees, graphs, and hash tables. 3. Develop analytical skills to assess the efficiency and performance of different data structures and algorithms. 4. Enhance problem-solving abilities by selecting and applying appropriate data structures and algorithms to solve programming challenges. 5. Foster critical thinking and algorithmic reasoning skills to design efficient and optimized solutions using data structures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the basic concepts and practical applications of data structures in programming. 2. Understand and implement link list, stack and queue data structures for organizing data. 3. Understand tree structures, implement binary trees, and perform tree traversals. Learn about balanced trees, implement AVL trees. 4. Understand heap and priority queue data structures for efficient data organization and prioritization. 5. Understand graph components and traversal techniques, such as DFS and BFS. 6. Implement hash tables for efficient data retrieval using hashing techniques. 7. Learn linear and binary search methods, implement them. 8. Implement selection sort, insertion sort, merge sort and quick sort algorithms and compare their efficiencies.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Overview of data structures and their importance in programming

	Basic terminology: elements, data types, operations Array operations: insertion, deletion, searching, and sorting [10 hours] Singly linked lists: structure, node representation, and traversal Operations on linked lists: insertion, deletion, and searching Stack operations: push, pop, and peek Queue operations: enqueue and dequeue [18 hours] Recursive functions and their implementation Recursive algorithms for factorial, Fibonacci sequence, and tower of Hanoi [6 hours] Binary trees: representation, traversal (in-order, pre-order, post-order) Binary search trees: insertion, deletion, and searching ,AVL trees: rotation operations and balancing, Red-Black trees: properties and balancing operations [12 hours] Heap operations: insertion, deletion, and heapify , Priority queues: definition and applications [6 hours] Introduction to graphs and their components (vertices and edges) Graph representations: adjacency matrix and adjacency list Graph traversal: depth-first search (DFS) and breadth-first search (BFS) Graph algorithms: connected components and topological sorting Minimum Spanning Trees (MST): Prim's and Kruskal's algorithms [12 hours] Introduction to hash tables and hashing techniques Hash functions: division method and multiplication method Collision resolution: chaining and open addressing [10 hours] Linear search and binary search algorithms Introduction to sorting algorithms: selection sort and insertion sort

	Merge sort and quicksort algorithms [19 hours]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Encouraging students to actively participate in class discussions, group activities, and problem-solving exercises. Providing opportunities for students to apply their knowledge through practical programming exercises and projects. Also, relating the course content to real-world scenarios and applications, helping students see the practical relevance of data structures and algorithms.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	89	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

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

Summative assessment	**Final Exam**	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Data Structures: Overview and Importance in Programming.
Week 2	Arrays and Dynamic Memory Allocation: Memory Representation and Manipulation of Arrays.
Week 3	Linked Lists: Structure, Operations, and Comparison with Arrays.
Week 4	Stacks and Queues: LIFO and FIFO Concepts for Data Organization.
Week 5	Recursion: Understanding Recursive Functions and Algorithms.
Week 6	Trees: Hierarchical Structure and Traversal Methods in Binary Trees. Balanced Trees (AVL and Red-Black Trees): Maintaining Balance in Tree Structures.
Week 7	**Mid Term Exam**
Week 8	Heaps and Priority Queues: Efficient Data Organization and Prioritization.
Week 9	Graphs (Part 1): Understanding Graph Components and Traversal Techniques.
Week 10	Graphs (Part 2): Algorithms for Connected Components and Minimum Spanning Trees.
Week 11	Hash Tables: Techniques for Efficient Data Retrieval using Hashing.
Week 12	Searching Algorithms: Linear and Binary Search Methods and their Time Complexity Analysis.
Week 13	Sorting Algorithms (Part 1): Introduction to Selection and Insertion Sort and their Time Complexity Analysis.
Week 14	Sorting Algorithms (Part 2): Merge Sort and Quick Sort and their Time Complexity Analysis.
Week 15	Review and Recap: Consolidation of Key Concepts and Exam Preparation Discussion.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1,2	Lab 1: Implementation and Operations on Linked Lists
Week 3,4	Lab 2: Implementing Stacks and Queues.
Week 5,6	Lab 3: Implementing Hash Tables with Various Hashing Techniques.
Week 7,8	Lab 4: Understanding and Implementing Tree Structures
Week 9,10	Lab 5: Depth-First Search and Breadth-First Search - Implementing Graph Traversal Algorithms.
Week 11,12	Lab 6: Searching Algorithms - Implementing and Analyzing Searching Algorithms.
Week 13,14,15	Lab 7: Sorting Algorithms - Implementing and Analyzing Sorting Algorithms.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Open Data Structures" by Pat Morin (Publisher: AU Press)	No
Recommended Texts	Problem Solving with Algorithms and Data Structures using Python" by Bradley N. Miller and David L. Ranum.	No
Websites	https://www.coursera.org/learn/data-structures-algorithms	

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
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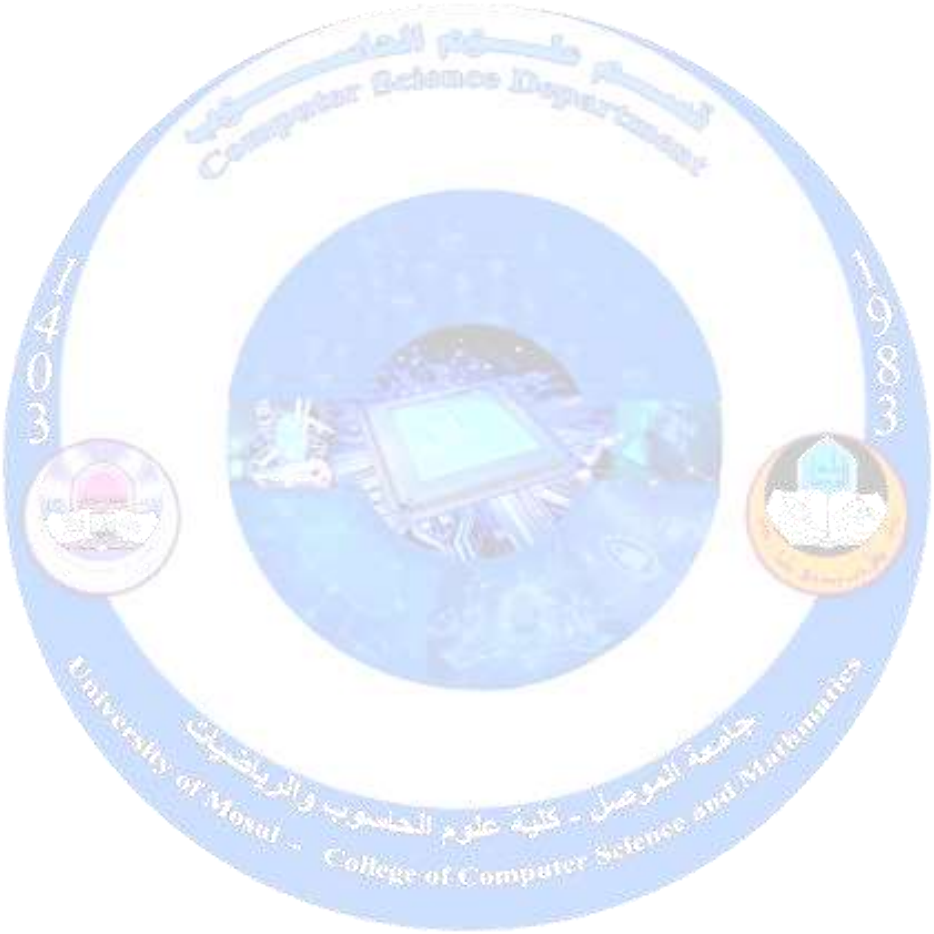

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Arabic Language 2** اللغة العربية 2			**Module Delivery**	
Module Type	**Elective**			☒ **Theory**	
Module Code	**UoM3CS312**			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Level		UGIII-3	**Semester of Delivery**		6
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	م.م. مروة عدنان اسماعيل		**e-mail**	Loversmewa80@gmail.com	
Module Leader's Acad. Title		Assist. Lecture	**Module Leader's Qualification**		MSc.
Module Tutor	NA		**e-mail**	NA	
Peer Reviewer Name		عائشة صديق	**e-mail**	Aeeshashaheen_1965@uomosul.edu.iq	
Scientific Committee Approval Date			**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-تقوية القدرة اللغوية لدى الطالب وإكسابه مهارة التعبير الصحيح 2- تنمية قدرات الطالب ومهاراته الخطية والاملائية ليتمكن من كتابة البحوث العلمية والتقارير بصورة صحيحة وكذلك يتمكن من استعمال علامات الترقيم ووضعها في المكان المناسب في الجملة , 3- تدريب الطالب على استخدام القواعد النحوية أثناء القراءة والكتابة والتعبير 4- تعويد الطالب على فهم المادة المقروءة والتعبير عنها بلغته الخاصة وذلك مما يشجع الطالب على التفكير والابتكار .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	يتوقع من الطالب بعد إنتهائه من دراسة مادة اللغة العربية تحقيق المخرجات الاتية : 1-معرفة القواعد النحوية 2- معرفة كيفية توظيف ادوات اللغة العربية في كتابة اي بحث علمي 3- تعزيز المحتوى العربي على الشبكة العنكبوتية 4- التعلم الالكتروني واستخدام الحاسوب في التعليم
Indicative Contents المحتويات الإرشادية	مفردات المادة : أهمية اللغة العربية : وهذا الموضوع الاول يتحدث عن اهمية اللغة العربية بصورة عامة مع ربط اعلاقة اللغة العربية بعلم الحاسوب (4 ساعات) اقسام الكلام : وهذا موضوع يقسم الى ثلاثة محاور وهي الاسم والفعل والحرف (8 ساعات) علامات الاعراب : يتحدث عن علامات اعراب الاسم والفعل ويقسم الى محورين علامات الاعراب الاصلية وعلامات الاعراب الفرعية (8 ساعات) المبتدأ والخبر :يتناول مفهوم المبتدأ والخبر واعرابه (6ساعات) كان واخواتها : هذا الموضوع يتعبر تكملة لموضوع الافعال (6ساعات) إن واخواتها : وهي من النواسخ , وهي احرف مشبهة بالفعل (8 ساعات) العدد : وهذا الموضوع مهم جدا لانه يعلم الطالب كيفية كتابة العدد من ناحية التذكير والتأنيث (2 ساعات)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	الطريقة المستخدمة لتعليم الطلاب مادة اللغة العربية هي القاء المحاضرة والشرح بإستخدام السبورة وفي بعض الاحيان نستخدم الداتا شو باستخدام شرائح عرض برنامج البوربوينت (اذا كانت المادة تتطلب لذلك) وكذالك تضمين المحاضرة اسئلة توجه للطلاب لمعرفة مدى فهمهم للمادة , واعطاءهم الواجب البيتي وفي منتصف الفصل يطلب من كل طالب تقرير حول مادة او مفردة معينة , مع الاكثار من الاختبارات اليومية لتساعدهم في حفظ المادة ورفع مستواهم العلمي ايضا .

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	44	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	6	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 3,
	Assignments	3	10% (10)	2, 12	LO # 2, 3, and 4
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 1, 2
Summative assessment	**Midterm Exam**	1 hr	10% (10)	7	LO # 1-3
	Final Exam	2 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	أهمية اللغة العربية
Week 2	علاقة اللغة العربية بعلم الحاسوب
Week 3	أقسام الكلام . الاسم
Week 4	الفعل
Week 5	الحرف
Week 6	علامات الاعراب الاصلية والفرعية
Week 7	**امتحان بالموضوعات (اهمية اللغة العربية وعلاقتها بعلم الحاسوب واقسام الكلام)**
Week 8	علامات الاعراب الفرعية
Week 9	الاسماء
Week 10	المبتدأ والخبر
Week 11	النواسخ
Week 12	كان واخواتها
Week 13	النواسخ
Week 14	ان واخواتها
Week 15	العدد
Week 16	الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**There is no lap in this Module**

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	كتاب النحو الوافي للمؤلف عباس حسن	NO
Recommended Texts	كتاب النحو الشافي للمؤلف محمود حسني وشرح ابن عقيل عن الفية ابن مالك	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
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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

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	**Computation Theory** **النظرية الاحتسابية**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**UOMCS109**			☒ **Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Level	UGI-1	**Semester of Delivery**	2		
Administering Department	Computer Science	**College**	College of Computer Science and Math.		
Module Leader	Mohammed Chachan Younis محمد جاجان يونس	**e-mail**	mohammed.c.y@uomosul.edu.iq		
Module Leader's Acad. Title	Associate Professor	**Module Leader's Qualification**	Ph.D.		
Module Tutor	Name (if available)	**e-mail**	E-mail		
Peer Reviewer Name	Ahmed Salih Hasan	**e-mail**	ahmed_salih_h@uomosul.edu.iq		
Scientific Committee Approval Date		**Version Number**	1.0		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	UOMCS104	**Semester**	UGI- 1
Co-requisites module	UOMCS210	**Semester**	UGII-2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Through this course, students will learn about different models of computation. The learning objectives of the course are to: 1. Familiarity with the basic concepts of computational theory, the basics of language theory, and general concepts in building programming languages in a mathematical manner. 2. Knowing and distinguishing the different operations that take place on languages and machines that each language recognizes. 3. Knowledge of the basics of automata theory and regular expressions as mathematical models that help in defining programming languages and formal languages. 4. The ability to use the concepts of computational theory as basic tools in building programming languages and how to derive them in a logical manner, as its tools represent an important part of the stages of building compilers for each programming language. 5. Acquisition of basic skills as an introduction to building languages and problem-solving. 6. Acquisition of theoretical concepts to know the various processes that take place on languages.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the module, students will have achieved the following: 1. Demonstrate advanced knowledge of formal computation and its relationship to languages 2. Distinguish different computing languages and classify their respective types 3. Recognise and comprehend formal reasoning about languages 4. Understand, use and work with grammars of various forms 5. Understand Finite Automata: DFA, NFA, and many more! 6. Specify and be able to simulate various types of automata 7. Able to extract computational model from a real-world problem 8. Be able to describe languages according to formal systems such as automata and context-free grammars 9. Learn Chomsky and Greibach Normal Forms problems 10. Master the fundamentals of Push Down Automata

	11. Master the fundamentals of Turing machines
Indicative Contents المحتويات الإرشادية	The indicative content of this module includes the following: <u>Part A - Language Theory</u> Basic Concept – Alphabet, Strings (words), Some Important Notations, String Operations, Operations on Languages, Specifying languages, Regular Expressions, Specifying languages by grammars, The Chomsky hierarchy of languages (Type-0, Type-1, Type-2, Type-3 Grammars), Languages theory problems. [10 hrs] Revision problem classes. [2 hrs] <u>Part B - Finite Automata (FA)</u> Deterministic (DFA) and Non-Deterministic Finite Automata (NDFA), Graphical Representation of DFA and NDFA, Acceptors (Recognizer) & Classifiers and Transducers, Problems (Finite Automata as an Acceptor), NDFA to DFA Conversion, Converting NDFA to DFA problems, FA with Output (Moore Machine and Mealy Machine), Moore Machine problems, Mealy Machine problems. [13 hrs] Revision problem classes. [2 hrs] <u>Part C - Context-Free Grammar (CFG)</u> Introduction to CFG, Generation of Derivation Tree, Representation Technique (Top-down and Bottom-up Approaches), Leftmost and Rightmost Derivation of a String, Left and Right Recursive Grammars. Ambiguity in CFGs, Unambiguous Grammar, Simplification of CFG (Removal of Useless Symbols, Removal of Null Productions, and Removal of Unit Productions), Simplification of CFG problems. [12 hrs] Revision problem classes. [2 hrs] <u>Part D - Chomsky Normal Form (CNF) and Greibach Normal Form (GNF)</u> Introduction to CNF, Converting CFG into CNF problems, Introduction to Greibach Normal Form (GNF), Converting CFG into GNF problems. Closure Properties of CFG (Union, Concatenation, Kleene Closure, Intersection and complementation). [15 hrs] Revision problem classes. [2hrs] <u>Part E - Pushdown Automata (PDA) and Turing Machine (TM)</u>

	Definition of PDA, Fundamentals of PDA, PDA Components (Input tape, Finite control, and Stack), Power of PDA, PDA problems, A Graphical Notation for PDA's problems, CFG to PDA Conversion problems. Definition of TM, Fundamentals of TM, Basic Model of TM, Comparison TM with the previous automaton, Designing a TM, Language accepted by TM, TM problems. [15 hrs] Revision problem classes. [2 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to understand which problems can be solved using computational devices and how efficiently those problems can be solved. 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			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	73	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية				
As	**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	2	10% (10)	6, 9	LO # 1-4, and 8
	Assignments	4	10% (10)	6, 10, 13, 15	LO # 2, 5, 6 and 8
	Projects / Lab.	0	0	0	
	Report	1	10% (10)	13	LO # 3, 4, 7 and 8
Summative assessment	**Midterm Exam**	1 hr	10% (20)	7	LO # 1-6
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Basic concepts, Set, Strings, alphabets and language
Week 2	Regular expressions
Week 3	Grammars: Definition, Specifying languages by grammars, The Chomsky hierarchy of languages
Week 4	Finite state automata: Acceptors, Classifiers, and Transducers
Week 5	Deterministic and nondeterministic finite state automata
Week 6	Finite State Automata with Output: Moor machine and Mealy machine
Week 7	**Mid Term Exam**
Week 8	Context Free Grammar and Languages
Week 9	Generation of Derivation Tree
Week 10	Simplification of context-free grammars, Ambiguity and Unambiguity in Context Free Grammars
Week 11	Properties of context free languages, closure properties of context free languages (union, concatenation, Kleene closure and substitutions
Week 12	Chomsky normal forms, converting Context Free Grammer into Chomsky Normal Form

Week 13	Greibach Normal Form, Converting Chomsky Normal Form into Greibach Normal Form
Week 14	Pushdown Automata (PDA), Convert Context Free Grammar to Push Down Automata
Week 15	Turing Machine (TM) Model, Technique for Turing machine construction
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**No lab**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Introduction to Computer Theory, 2nd Edition, by Daniel I. A. Cohen John Wiley & Sons, Inc 1997. ISBN 0-471-13772-3.	No
Recommended Texts	- Introduction to Automata Theory, Languages, and Computation, 2/E, by John E. Hopcroft, Rajeev M., Jeffrey D. Ullman, Addison-Wesley 2001. ISBN 0-201-44124-1. - Introduction to the Theory of Computation, 2nd Edition, Boston, MA: Course Technology, by Michael Sipser 2006. ISBN: 0534950973.	No
Websites	- PDA & Context-Free Grammar (tutorialspoint.com) - Automata Tutorial - GeeksforGeeks	

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	**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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**The Crimes of the Baath System in Iraq** جرائم نظام البعث في العراق			**Module Delivery**	
Module Type	**Elective**			☒ **Theory**	
Module Code	**UOM2050**			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	Computer Science		**College**	Computer Science and Mathematics	
Module Leader	م.م. عمر دريد ذنون		**e-mail**	Omer.thnon@uomusul.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.A.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Haleema Essa solayman		**e-mail**	Haleema_essa@uom.edu.iq	
Scientific Committee Approval Date			**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	9. توضيح المفاهيم السياسية لدى الطلبة وترسيخ الهوية الوطنية فضلا عن تعزيز القيم المشتركة بين افراد المجتمع الواحد ليمارسوا ادوارهم السياسية ومشاركتهم في الانتخابات مما يسهم في تعزيز الوحدة الوطنية 10. اوان تدريس هذه المادة له اثر كبير في بناء ثقافة المشاركة الواعية واكساب الطلبة مهارة التفكير 11. تعزيز فكرة العدالة الاجتماعية.. 12. تسهم في منح مساحة اكبر للحديث عن الديمقراطية وحقوق الانسان والتنمية السياسية 13. وتتحدث عن الحياة السياسية وتطورها ونشأتها 14. اعتماد اسلوب الحوار والمناقشة ومالمناظرة في تدريسها 15. تعزيز سبل التعليم التفاعلي.. 16. تعزيز **سبل** المشاركة في الشأن العام – المواطنة
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	أ-الاهداف المعرفية تدريس المبادئ الرئيسية للديمقراطية ومصادرها وأنواعها والآليات المستخدمة لحمايتها. اما الجانب السلوكي لابد أن تستهدف مقررات الديمقراطية وترجمة المعارف والخبرات والقيم وأنماط السلوك إلى عمل دائم ونشاط مستمر من أجل الدفاع عنها في الواقع المعاش وتعزيز الجهود الكفيلة بمعالجة قضايا حقوق الإنسان **ب- الأهداف المهاراتية الخاصة بالمقرر** 1.تبني ورعاية وتشجيع صفات التسامح والاحترام والتضامن المتأصلة في الديمقراطية. 2.التعريف بالديمقراطية من بعديها الإقليمي والدولي. 3. تنوير الافراد بحقوقهم الشخصية وغرس احترام الاخرين في نفوسهم . 5.إعطاء العناية الى التنوير بالصلة الوثيقة بين الديمقراطية من جانب والتنمية والسلام بما فيها نزع السلاح من الجانب الاخر ، والحاجة الى اقامة نظام عالمي جديد في الاقتصاد والاجتماع والثقافة لاعانة كل الناس على الاستمتاع بحقوقهم الإنسانية وتطوير ذواتهم. 6.إعطاء تركيز مناسب للحقوق الاقتصادية والاجتماعية والثقافية والمدنية بالإضافة للحقوق السياسية ، وكذلك الحقوق الفردية والجماعية على اعتبار عدم قابلية هذه الحقوق للتقسيم او التجزئة ج- المهارات العامة والتأهيلية المنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي في سبيل: . تعزيز احترام الديمقراطية والحريات الأساس .الإنماء الكامل للشخصية الإنسانية وإحساسها بالكرامة

	تعزيز التفاهم والتسامح والمساواة بين الجنسين، والصداقة بين جميع الأمم والسكان الأصليين والمجموعات العرقية والقومية والإثنية والدينية واللغوية. تمكين كل الأفراد من المشاركة بفاعلية في مجتمع حر
Indicative Contents المحتويات الإرشادية	المدخل للديمقراطية ,التعريف العام للديمقراطية[5 hrs] انواع الديمقراطية ,خصائص النظام الديمقراطي[5 hrs] مميزات النظام الديمقراطي ,اهم الاستنتاجات عن النظام الديمقراطي[5 hrs] المرتكزات الفكرية للديمقراطية ,قياس الديمقراطية , نظرة الاسلاميون للديمقراطية[5 hrs] عناصر النمط الديمقراطي , الاسس العامة للديمقراطية ,عناصر الديمقراطية[5 hrs] المشاركة السياسية , اهم انماط المشاركة السياسية[5 hrs] الانتخابات , شروط الانتخابات وشروط الناخب والمنتخب[5 hrs] التي [5 hrs]اهمية الانتخابات , الرقابة على الانتخابات , النواب والمسؤولية , البرلمان , اهم الصلاحيات يتمتع بها البرلمان الفصل بين [4hrs] المعارضة , مستويات المعارضة , اهداف المعارضة , عناصر تحديد موقع المعارضة , الحكومة والبرلمان

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	محاضرات- ورش عمل - ندوات

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	44	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	6	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2 and 4
	Assignments	2	10% (10)	2, 12	LO # 6
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 3,5
Summative assessment	**Midterm Exam**	1 hr	10% (10)	7	LO # 1-6
	Final Exam	2 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	المدخل للديمقراطية ,التعريف العام للديمقراطية
Week 2	انواع الديمقراطية ,خصائص النظام الديمقراطي
Week 3	مميزات النظام الديمقراطي ,اهم الاستنتاجات عن النظام الديمقراطي
Week 4	المرتكزات الفكرية للديمقراطية ,قياس الديمقراطية , نظرة الاسلاميون للديمقراطية
Week 5	الديمقراطية والشورى , الديمقراطية والرأسمالية
Week 6	عناصر النمط الديمقراطي , الاسس العامة للديمقراطية ,عناصر الديمقراطية
Week 7	مراجعة سريعة , امتحان
Week 8	المشاركة السياسية , اهم انماط المشاركة السياسية
Week 9	الانتخابات , شروط الانتخابات وشروط الناخب والمنتخب
Week 10	صفات الانتخابات , انواع القوانين الانتخابية , طرق الانتخابات
Week 11	اهمية الانتخابات , الرقابة على الانتخابات , النواب والمسؤولية , البرلمان , اهم الصلاحيات التي يتمتع بها البرلمان

Week 12	المعارضة , مستويات المعارضة , اهداف المعارضة , عناصر تحديد موقع المعارضة , الفصل بين الحكومة والبرلمان
Week 13	مبادئ الدستور الديمقراطي , الشروط العامة للديمقراطية ,الحزب السياسي اشكال وانواع الاحزاب السياسية
Week 14	التداول السلمي والشرعي للسلطة ,احترام مبدأ الاغلبية ,الديمقراطية النيابية
Week 15	الامتحان الفصلي
Week 16	مراجعة قبل الامتحان النهائي

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	أ- الكتب الدراسية والمنهجية المقررة من اللجنة العلمية ولجان الاعتماد والأكاديمي .	Yes
Recommended Texts	ب- المحاضرات المؤرشفة من قبل تدريسي الاختصاص لكل مادة ورقية كانت أم فيدوية	No
Websites	ج- مواقع شبكة الانترنت الرسمية المعتمدة من قبل الجامعة .	

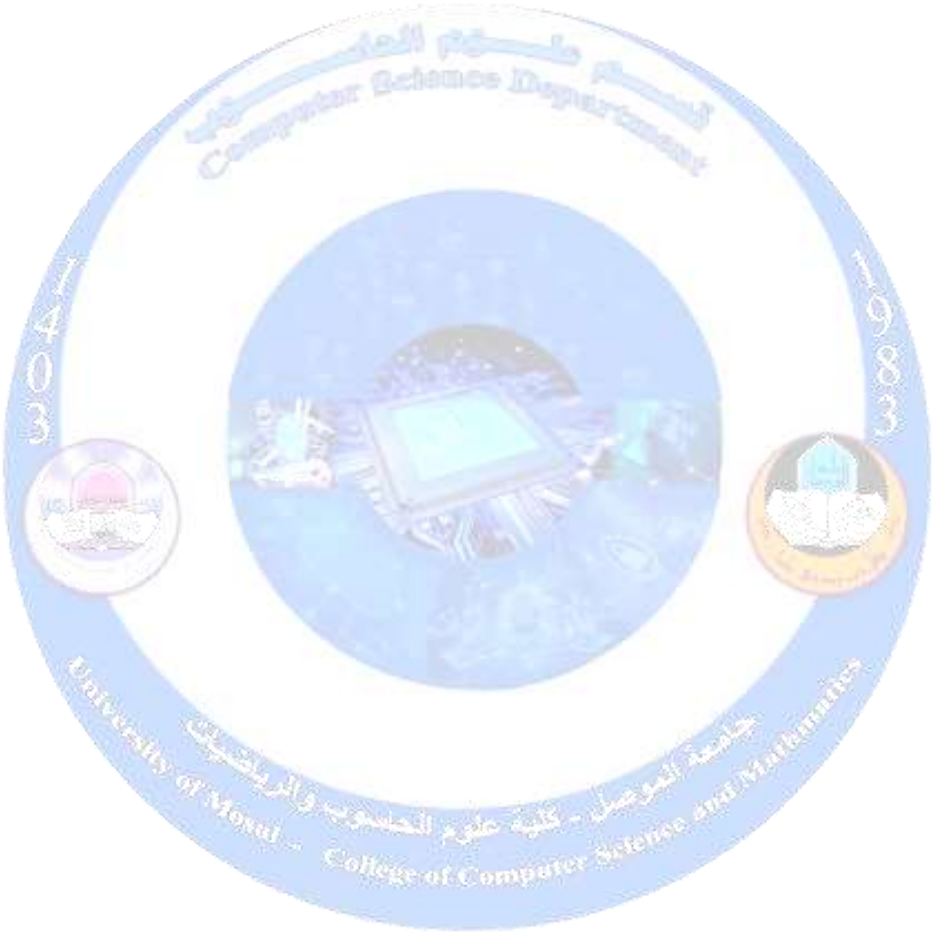
Grading Scheme

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

ملاحظة : سيتم تقريب العلامات العشرية أعلى أو أقل من 0.5 إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال ، سيتم تقريب علامة 54.5 إلى 55 ، في حين سيتم تقريب علامة 54.4 إلى 54. لدى الجامعة سياسة عدم التغاضي "فشل التمرير القريب" لذا فإن التعديل الوحيد للعلامات الممنوحة بواسطة العلامة (العلامات) الأصلية سيكون التقريب التلقائي الموضح أعلاه



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Object Oriented Programming 2** **البرمجة الكيانية 2**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**UoMCS207**			☒ **Lecture**	
ECTS Credits	**6**			☒ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level		UGII	**Semester of Delivery**		Three
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	م. زيد عبد الاله منذر		**e-mail**	zaidabdulelah@uomosul.edu.iq	
Module Leader's Acad. Title		Lecture	**Module Leader's Qualification**		Master
Module Tutor	م.م. ياسر علي محمود		**e-mail**	yaser.ali@uomosul.edu.iq	
Peer Reviewer Name		Ruba Talal	**e-mail**	rubatalal@uomosul.edu.iq	
Scientific Committee Approval Date			**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	5. Abstraction: hiding the implementation details and showing only functionality to the user. 6. Encapsulation: data hiding. 7. Polymorphism: the ability to take more than one form. 8. Inheritance: objects of one class acquire the properties of objects of another class.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Codes basic programs in C# programming language 2. Uses objects and classes 3. Lists the object-oriented programming concepts 4. Declares objects and classes 5. Distinguishes classes and objects 6. Declares and uses variables 7. Declares and uses methods and properties 8. Explains and uses encapsulation 9. Explains and uses inheritance 10. Explains and uses polymorphism 11. Explains and handles exceptions 12. Describes exceptions 13. Throws exceptions 14. Catches exceptions
Indicative Contents المحتويات الإرشادية	Basics of C# [6 hrs] Characteristics of Object-Oriented Programming [6 hrs] Classes and Objects [10 hrs] Working with Constructors Data Members [12 hrs]

	Using Static Variables & Understanding Scope [12 hrs] Overloading [15 hrs] Inheritance [10 hrs] Exceptions and Errors [13]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Some of the popular teaching and learning strategies will be used in this class. Visualization, Teamwork and Inquiry-Based Teaching are examples of some of these strategies. Encourage students' participation in the exercises also will be considered.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	89	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

As		**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
	Projects / Lab.				

	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Getting Started with C#
Week 2	Understanding C# Programs
Week 3	Characteristics of Object-Oriented Programming
Week 4	Classes and Objects
Week 5	Constructors
Week 6	Working with Data Members
Week 7	**Midterm Exam**
Week 8	Overloading Methods & Constructors
Week 9	Reusing Existing Code with Inheritance
Week 10	Reusing Existing Code with Inheritance
Week 11	Reusing Existing Code with Inheritance
Week 12	Polymorphism, Interfaces and Operator Overloading
Week 13	Polymorphism, Interfaces and Operator Overloading
Week 14	Exceptions and Errors
Week 15	Exceptions and Errors
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1,2	Lab 1: First experiment (Write first program in C#)
Week 3,4	Lab 2: Second experiment (Constructors)
Week 5,6	Lab 3: Third experiment (Overloading Methods & Constructors)
Week 7,8	Lab 4: Fourth experiment (Reusing Existing Code with Inheritance)
Week 9,10	Lab 5: Fifth experiment (Polymorphism, Interfaces and Operator Overloading)
Week 11,12	Lab 6: Sixth experiment (Exceptions and Errors)
Week 13,14,15	Lab 7: seventh Experiment (It incorporates all the skills learned during the laboratories)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Microsoft Visual C# 2017 : An Introduction to Object-Oriented Programming, Seventh Edition	No
Recommended Texts	Sams Teach Yourself the C# Language in 21 Days	No
Websites		

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	**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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Architecture** معمارية الحاسوب			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**UoMCS208**			☒ **Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level		UGx11 UGII	**Semester of Delivery**		4
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	Dr.Wael Wadullah Mahmood		**e-mail**	wael.hadeed@uomosul.edu.iq	
Module Leader's Acad. Title		Lec.	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Rana Muayad Hasan	**e-mail**	ranamuayad@uomosul.edu.iq	
Scientific Committee Approval Date			**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. Introduction to the basic roles and responsibilities for each of the major hardware components of a computer. 2. Review the need to use a memory hierarchy, perform memory management, and to explain to them the various memory management techniques and their tradeoffs 3. Describe the structure, function, and purpose of the computer for presentation as clearly and completely as possible
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Have a clear understanding of the Computer terminology. 2. Have knowledge of Computer architecture and Hardware specifications. 3. Have knowledge of different types of comuters and techniques. 4. Review the need to use a memory hierarchy, perform memory management, and to explain to them the various memory management techniques and their tradeoffs. 5. Prepare and deliver coherent and structured verbal and written technical reports. 6. Review operation of hardware and software working synergistically together.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Introduction to Organization & Architecture</u> Introduction to Computer, Basic Concepts, Computer Function and Structure [5 hrs] Von neuman machine, Flynn computer architecture classification [5 hrs] Computer memory system [5 hrs] SRAM & DRAM [3 hrs] RAM design and ROMs [5 hrs] Cache memory principles and structure [5 hrs]

	Part B - 8086 Instruction set: Microprocessor Programming Interleaved memory [5 hrs] Address interleaving and performance model; Virtual Memory Concept [5 hrs] Paging and Segmentation mechanism [5 hrs] CPU (Register, Hardware, Micro programmed and I/O) Organization [3 hrs] Programmed and interrupt I/O [3 hrs] introduction to parallel processing (SISD,SIMD,MISD,MIMD) [4 hrs] pipeline structure [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Provides comprehensive converge of computer architecture including memory, CPU, I/O and parallel system.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	59	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
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	150		

Module Evaluation تقييم المادة الدراسية

As		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
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	1 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Computer, Basic Concepts
Week 2	Computer Function and Structure
Week 3	Von neuman machine
Week 4	Flynn computer architecture classification
Week 5	Computer memory system
Week 6	Cache memory principles and structure
Week 7	Mid-term Exam
Week 8	Interleaved memory
Week 9	Address interleaving and performance model
Week 10	Virtual Memory Concept
Week 11	Paging and Segmentation mechanism
Week 12	CPU (Register, Hardware, Micro programmed and I/O) Organization

Week 13	Programmed and interrupt I/O
Week 14	introduction to parallel processing (SISD,SIMD,MISD,MIMD)
Week 15	pipeline structure
Week 16	**Preparatory week before the final Exam**

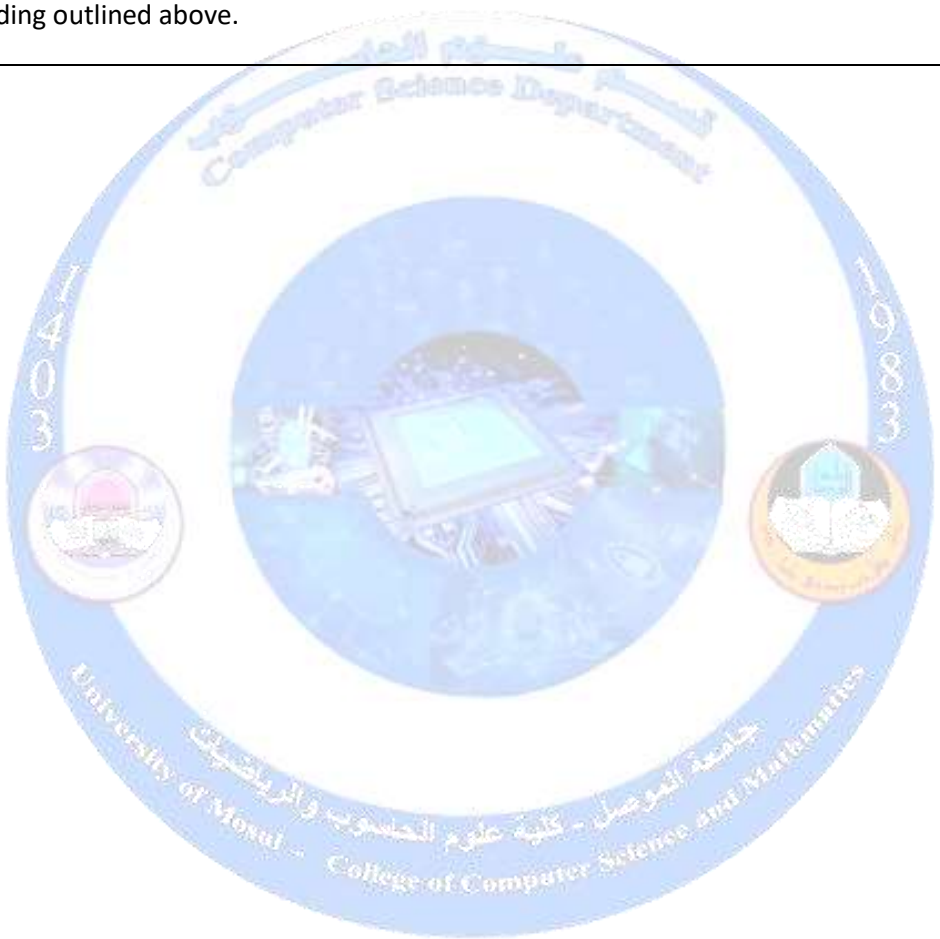
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
	No Labs

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	William stalling, Computer organization & architecture,2003	Yes
Recommended Texts	Daniel. A practical introduction to computer architecture. Springer Science & Business Media, 2009.	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	**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 DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Distributed Database** **قواعد البيانات الموزعة**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**UoMCS209**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		Four (4)
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	Rayan Yousif Yacob Alkhayat		**e-mail**	rayan@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Rana Muayad Hasan	**e-mail**	ranamuayad@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Database Fundamental - UoMCS202	**Semester**	Three (3)
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. To introduce distributed database systems DDBSs to the students. 2. To expose the benefits of using DDBS in real life. 3. Definitions of basic concepts of distributed database systems. 4. To enable students to understand the structural fundamentals of DDBSs. 5. To enable students creating and managing DDBSs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the structure of distributed database . 2. List the various distributed database systems. 3. Summarize what is meant Distributed and Parallel Database Design. 4. Discuss the benefits of distributed query processing. 5. Describe the data replication. 6. Identify the Database Integration – Multidatabase Systems 7. Discuss the NoSQL, NewSQL and Polystores. 8. Discuss the various properties of distributed database systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part I : Definitions, Creation, and Implementation: - Distributed Database Structure - Data Delivery Alternatives, Promises of DDBSs, Level of sharing, Behavior of access patterns, Level of knowledge on access pattern behavior , Top-Down Design Process. [10 hrs] Data and Access Control– Views in Centralized DBMSs, Views in Distributed DBMSs, Maintenance of Materialized Views. [10 hrs] Data Security - Discretionary Access Control , Multilevel Access Control Distributed Access Control. [10 hrs] Overview of Query Processing - Query Processing Problem Objectives of Query Processing, Complexity of Relational Algebra Operations Characterization of Query Processors. [10 hrs] Revision problem classes [9 hrs]

	Part II: Query and Transactions:- Query Decomposition and Data Localization : Query Decomposition, Normalization, Analysis, Elimination of Redundancy, Localization of Distributed Data. [10 hrs] Optimization of Distributed Queries- Query Optimization, Centralized Query Optimization, Join Ordering in Distributed Queries Distributed Query Optimization. [10 hrs.] Multidatabase Query Processing – Multidatabase Query Processing Architecture, Query Rewriting Using Views Query Optimization and Execution Query Translation and Execution, Properties of Transactions, Types of Transactions, Architecture Revisited. [10 hrs.]. Distributed Concurrency Control and Distributed DBMS Reliability: Taxonomy of Concurrency Control Mechanisms, Locking-Based Concurrency Control Algorithms, Timestamp-Based Concurrency Control Algorithms, Deadlock Management, Reliability Concepts and Measures , Local Reliability Protocols, Distributed Reliability Protocols, Network Partitioning. [5 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The course has dual objectives. The first is an in-depth study of the classical distributed database management issues such as distribution design, distributed query processing and optimization, and distributed transaction management. The second objective is to study more current distributed database management topics such as pervasive computing, Web data management, different distribution models (push versus pull), interoperability and componentization, and data mining on the web.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	89	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150

Module Evaluation

تقييم المادة الدراسية

As		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
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction
Week 2	Distributed and Parallel Database Design
Week 3	Distributed Data Control
Week 4	Distributed Query Processing
Week 5	Distributed Transaction Processing
Week 6	Data Replication
Week 7	**Mid-term Exam**
Week 8	Database Integration – Multidatabase Systems
Week 9	Parallel Database Systems

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 10	Peer-to-Peer Data Management
Week 11	Big Data Processing
Week 12	NoSQL, NewSQL and Polystores
Week 13	Web Data Management
Week 14	Distributed and Parallel Database Design
Week 15	Database Integration – Multidatabase Systems
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Introduction to distributed database systems architecture.
Week 2	Lab 2: Introducing MS-SQL Server for DDBSs.
Week 3	Lab 3: Creating simple DDB , managing tables and records.
Week 4	Lab 4: How to access remote DDB, LAN experiment.
Week 5	Lab 5: Maintaining relations between connected DDB tables – Part1
Week 6	Lab 6: Maintaining relations between connected DDB tables – Part 2
Week 7	Lab 7: Lab Test
Week 8	Lab 8: Altering database, update, and modification – Part 1
Week 9	Lab 9: Altering database, update, and modification – Part 2
Week 10	Lab 10: Managing network based DDB.
Week 11	Lab 11: Lab subjects review
Week 12,13,14,15	Lab 12: Semester final test.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Principles of Distributed Database Systems, 4th Edition. Özsu, T., & Valduriez, P. Springer 2020.	Yes
Recommended Texts	Distributed Database Systems, Jindal, G., & Ray, C. (2010).	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
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	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	**Data Structures 2** هياكل البيانات 2			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	**UoMCS210**			☒ **Lecture**	
ECTS Credits	**5**			☒ **Lab**	
SWL (hr/sem)	**125**			☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level		UGII-2	**Semester of Delivery**		3
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	Ban Sharief Mustafa		**e-mail**	Banmustafa66@uomosul.edu.iq	
Module Leader's Acad. Title		Associate Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Ruba Talal	**e-mail**	rubatalal@uomosul.edu.iq	
Scientific Committee Approval Date			**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	6. Develop a comprehensive understanding of fundamental data structures and their practical applications in programming. 7. Gain proficiency in implementing and manipulating data structures, including arrays, linked lists, stacks, queues, trees, graphs, and hash tables. 8. Develop analytical skills to assess the efficiency and performance of different data structures and algorithms. 9. Enhance problem-solving abilities by selecting and applying appropriate data structures and algorithms to solve programming challenges. 10. Foster critical thinking and algorithmic reasoning skills to design efficient and optimized solutions using data structures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	9. Understand the basic concepts and practical applications of data structures in programming. 10. Understand and implement link list, stack and queue data structures for organizing data. 11. Understand tree structures, implement binary trees, and perform tree traversals. Learn about balanced trees, implement AVL trees. 12. Understand heap and priority queue data structures for efficient data organization and prioritization. 13. Understand graph components and traversal techniques, such as DFS and BFS. 14. Implement hash tables for efficient data retrieval using hashing techniques. 15. Learn linear and binary search methods, implement them. 16. Implement selection sort, insertion sort, merge sort and quick sort algorithms and compare their efficiencies.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Overview of data structures and their importance in programming

	Basic terminology: elements, data types, operations Array operations: insertion, deletion, searching, and sorting [10 hours] Singly linked lists: structure, node representation, and traversal Operations on linked lists: insertion, deletion, and searching Stack operations: push, pop, and peek Queue operations: enqueue and dequeue [18 hours] Recursive functions and their implementation Recursive algorithms for factorial, Fibonacci sequence, and tower of Hanoi [6 hours] Binary trees: representation, traversal (in-order, pre-order, post-order) Binary search trees: insertion, deletion, and searching ,AVL trees: rotation operations and balancing, Red-Black trees: properties and balancing operations [12 hours] Heap operations: insertion, deletion, and heapify , Priority queues: definition and applications [6 hours] Introduction to graphs and their components (vertices and edges) Graph representations: adjacency matrix and adjacency list Graph traversal: depth-first search (DFS) and breadth-first search (BFS) Graph algorithms: connected components and topological sorting Minimum Spanning Trees (MST): Prim's and Kruskal's algorithms [12 hours] Introduction to hash tables and hashing techniques Hash functions: division method and multiplication method Collision resolution: chaining and open addressing [10 hours] Linear search and binary search algorithms Introduction to sorting algorithms: selection sort and insertion sort

	Merge sort and quicksort algorithms [19 hours]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Encouraging students to actively participate in class discussions, group activities, and problem-solving exercises. Providing opportunities for students to apply their knowledge through practical programming exercises and projects. Also, relating the course content to real-world scenarios and applications, helping students see the practical relevance of data structures and algorithms.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	89	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

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

Summative assessment	**Final Exam**	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Data Structures: Overview and Importance in Programming.
Week 2	Arrays and Dynamic Memory Allocation: Memory Representation and Manipulation of Arrays.
Week 3	Linked Lists: Structure, Operations, and Comparison with Arrays.
Week 4	Stacks and Queues: LIFO and FIFO Concepts for Data Organization.
Week 5	Recursion: Understanding Recursive Functions and Algorithms.
Week 6	Trees: Hierarchical Structure and Traversal Methods in Binary Trees. Balanced Trees (AVL and Red-Black Trees): Maintaining Balance in Tree Structures.
Week 7	**Mid Term Exam**
Week 8	Heaps and Priority Queues: Efficient Data Organization and Prioritization.
Week 9	Graphs (Part 1): Understanding Graph Components and Traversal Techniques.
Week 10	Graphs (Part 2): Algorithms for Connected Components and Minimum Spanning Trees.
Week 11	Hash Tables: Techniques for Efficient Data Retrieval using Hashing.
Week 12	Searching Algorithms: Linear and Binary Search Methods and their Time Complexity Analysis.
Week 13	Sorting Algorithms (Part 1): Introduction to Selection and Insertion Sort and their Time Complexity Analysis.
Week 14	Sorting Algorithms (Part 2): Merge Sort and Quick Sort and their Time Complexity Analysis.
Week 15	Review and Recap: Consolidation of Key Concepts and Exam Preparation Discussion.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1,2	Lab 1: Implementation and Operations on Linked Lists
Week 3,4	Lab 2: Implementing Stacks and Queues.
Week 5,6	Lab 3: Implementing Hash Tables with Various Hashing Techniques.
Week 7,8	Lab 4: Understanding and Implementing Tree Structures
Week 9,10	Lab 5: Depth-First Search and Breadth-First Search - Implementing Graph Traversal Algorithms.
Week 11,12	Lab 6: Searching Algorithms - Implementing and Analyzing Searching Algorithms.
Week 13,14,15	Lab 7: Sorting Algorithms - Implementing and Analyzing Sorting Algorithms.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Open Data Structures" by Pat Morin (Publisher: AU Press)	No
Recommended Texts	Problem Solving with Algorithms and Data Structures using Python" by Bradley N. Miller and David L. Ranum.	No
Websites	https://www.coursera.org/learn/data-structures-algorithms	

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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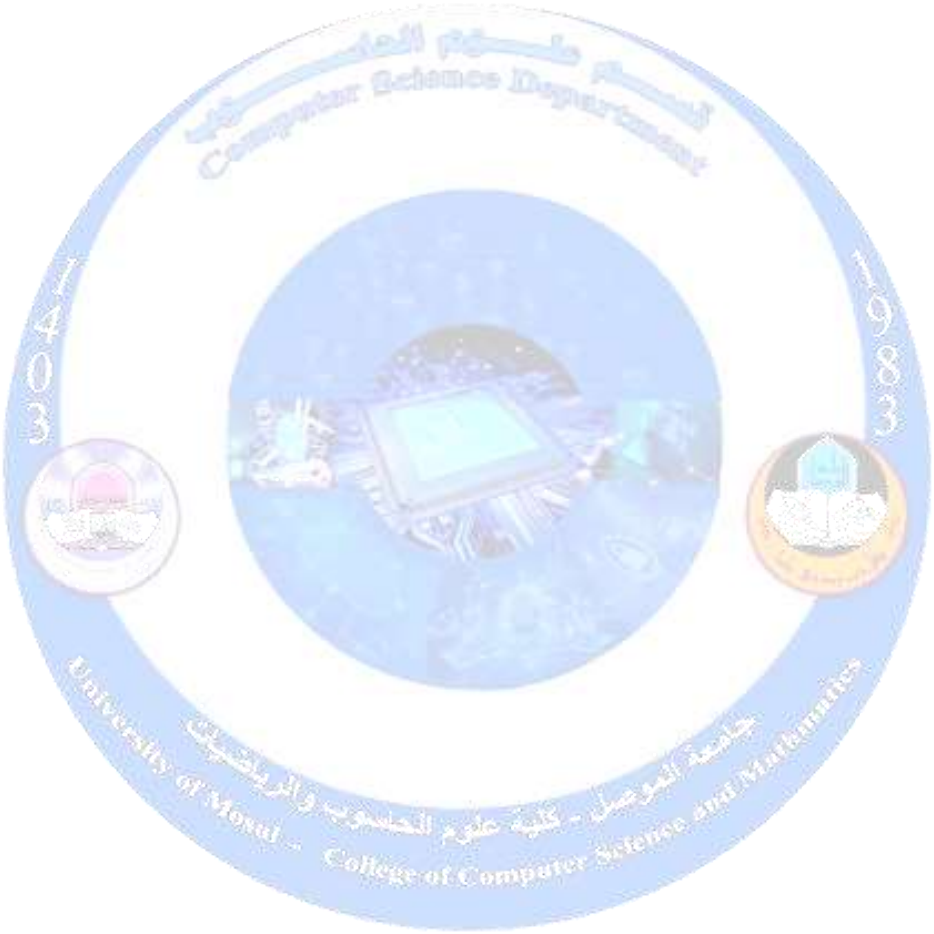


MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Software Engineering** هندسة البرمجيات			**Module Delivery**	
Module Type	**Support**			☒ **Theory**	
Module Code	**UoMCS211**			☒ **Lecture**	
ECTS Credits	**5**			☒ **Lab**	
SWL (hr/sem)	**125**			☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	Dr. Shayma Mustafa Mohi-Aldeen		**e-mail**	shaymamustafa@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Rana Muayad Hasan	**e-mail**	Ranamuayad@uomosul.edu.iq	
Scientific Committee Approval Date			**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. Introducing the concept of software engineering, and providing the activities necessary to produce various systems. 2. How to design software to solve big problems by understanding software engineering methodsand software development phases. 3. To enable the student to use the Enterprise Architect program, which is a UML (Unified Modeling Language) modeling tool that enables the student to manage and design large projects by using the diagrams provided by this tool in analyzing, designing and testing large systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students will be able: 1. To know the meaning of software engineering and its goals. 2. To understand the various software process models. 3. To compare and select a process model for a business system. 4. To identify and specify the requirements for the development of an application and the SRS document. 5. To know the different software design techniques and architectural styles. 6. To develop and design efficient, reliable and cost effective software solutions. 7. To learn the software testing approaches and metrics used in software development. 8. To understand the different types of testing and the comparison between them. 9. To know about project management process and risk management. 10. To enable the students to manage theprocess of design and developthe big software by using the diagrams of UML.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: **<u>Part A -Software Engineering</u>** Definition, Applications and problems–Software Engineering Goals, Conflicting and Complementary goals of SWE, ,Software Process models: Water fall Model, Prototyping, Evolutionary development, Formal systems development. [10 hrs]

	Software Requirements - Objectives, Requirements Engineering Process, Types of Requirements, Software Requirement Specification, Software Requirement Validation and verification. [10 hrs] Analysis Model - Analysis Model Types and examples, Formal Specification, Formal methods, Formal Specification Languages. Software Design- Design and Quality, Software Design Levels, Fundamental Design Concepts. [10 hrs] Functional independence: Definition, Cohesion and its types, Coupling and its types, Effective Modular Design. Design elements: Data, Architectural and procedural design, Top-Down and Bottom-Up Design, Structured Design, Transform and Transaction Mapping. [10 hrs] **Part B - Software Testing** Definition and Objectives, Exhaustive Testing, Test case design, Software Testing Strategies. White Box Testing: Basis path testing, Basis path method with examples, Condition testing, Data flow testing ,Loop testing. Black Box Testing: Black box testing techniques - Boundary Value Analysis, Equivalence Class Partitioning. Types of Testing: Unit (Module) Testing, Integration testing, Validation testing, System testing, Acceptance testing. [30 hrs] **Part C- Software project management** Definition and goals, Project Management Tools, Risk management, Resource management, Project Execution & Monitoring, Project Scheduling. [14 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This module will be offered as a contact module, as students will require to attend learning opportunities and lectures using the traditional timetable. However, Google Classroom will be used to accommodate a blend of learning and teaching methods to facilitate learning. Learning material (Power Points and readings) will be made available to students at least one week before a contact session.

	Students will be engaged with case studies and work examples to apply the theoretical knowledge and theories to these case studies. This will be dealt with in group work skills.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	89	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	4, 11	LO #1, 2, 3, 4, 6 and 7
	Assignments	3	10% (10)	2, 6, 12	LO # 1, 5, 7 and 8
	Projects / Lab.				
	Report	1	10% (10)	14	LO # 3, 5 and 9
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction- Software definition, applications and problems,Software engineering definition.
Week 2	Software Engineering Goals, The conflicting and complementary goals of SWE,Software Process models (Software lifecycle): Water fall Model.
Week 3	Software Process models (continuous): Prototyping, Evolutionary development, Formal systems development.
Week 4	Software Requirements: Objectives, Requirements Engineering Process, Types of Requirements, Software Requirement Specification, Software Requirement Validation and verification.
Week 5	Analysis Model: Analysis Model Types and examples, Formal Specification, Formal methods, Formal Specification Languages.
Week 6	Software Design: Design and Quality, Software Design Levels, Fundamental Design Concepts.
Week 7	**Mid-term Exam**
Week 8	Functional independence: Definition, Cohesion and its types, Coupling and its types, Effective Modular Design.
Week 9	Design elements: Data, Architectural and procedural design, Top-Down and Bottom-Up Design, Structured Design, Transform and Transaction Mapping.
Week 10	Software Testing: Definition and Objectives, Exhaustive Testing, Test case design, Software Testing Strategies.
Week 11	White Box Testing: Basis path testing,Basis path method with examples, Condition testing, Data flow testing, Loop testing.
Week 12	Black Box Testing: Black box testing techniques - Boundary Value Analysis, Equivalence Class Partitioning
Week 13	Types of Testing: Unit (Module) Testing, Integration testing, Validation testing, System testing, Acceptance testing.
Week 14	Software project management: definition and goals, Project Management Tools.
Week 15	Risk management, Resource management, Project Execution & Monitoring, Project Scheduling.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: Introduction to UML
Week 2	Lab 2: Types of UML Diagrams
Week 3	Lab 3: Use Case Diagram, Examples of use case diagram
Week 4	Lab 4: Use Case Diagram Entities and Relations.
Week 5	Lab 5: Project
Week 6	Lab 6: Class Diagram, Examples of Class Diagram.
Week 7	Lab 7: Relations of Class Diagram
Week 8	Lab 8: Project
Week 9	Lab 9: Data Flow Diagram
Week 10	Lab 10: Examples of Data Flow Diagram.
Week 11	Lab 11: Project
Week 12	Lab 12: Sequence Diagram
Week 13	Lab 13: Examples of Sequence Diagram.
Week 14,15	Lab 14: Project

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Software engineering A practitioner's approach, Third Edition, Roger S. Pressman, 2005.	Yes
Recommended Texts	1. Software engineering, Eighth Edition, Ian Somerville, 2007. 2. Enterprise Architect User Guide, by Geoffrey Sparks, 2009.	No
Websites	https://www.slideshare.net/ShudipPal/software-engineering-requirements-engineering-software-maintenance?from_search=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	**English Language 2** اللغة الإنكليزية ٢			**Module Delivery**	
Module Type	**Elective**			☐ **Theory**	
Module Code	UoMCS212			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Computer Science	**College**	Computer Science and Mathematics	
Module Leader	Zainab Qusay Ahmed Taqi		**e-mail**	Zainab.q@uomosul.edu.iq	
Module Leader's Acad. Title		Asst. lecturer	**Module Leader's Qualification**		MSc.
Module Tutor			**e-mail**		
Peer Reviewer Name		Rana Muayad Hasan	**e-mail**	ranamuayad@uomosul.edu.iq	
Scientific Committee Approval Date			**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 be able to speak English fluently and accurately. 2. To think in English and then speak. 3. To be able to talk in English. 4. To be able to compose freely and independently in speech and writing. 5. To be able to read books with understanding.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To address grammar issues that students encounter in their daily speech, writing, reading and listening 2. To address the issue of grammatical errors that affect effective communication 3. To improve your reading skills through the practice of vocabulary enrichment, reading comprehension exercises, written responses, discussions, and reflections 4. Recognize the structure and organization of paragraphs, 5. Use strategies to think critically about reading and use appropriate technology to enhance reading comprehension, and vocabulary development. 6. Develop the writing skill.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction, Study materials. [2 hrs] Grammar (quantity)(much/many, a few, a little, little, a lot of, lots), questions and answers. Articles, reeding (about shopping). Vocabulary: Shopping, prices, listening and reading. Verb patterns (want/hope to do), making questions. Future intentions:

	going to/will, practices, reading about Hollywood kids., Vocabulary: hot verbs: have, go, come, listening, everyday English: how do you feel?. [10 hrs] Grammar: What….. like?, Comparative and superlative adjectives big, bigger, biggest good, better, best, practices. Vocabulary: Synonyms and antonyms. Everyday English about directions, listening and reading. [10 hrs] Grammar: present tense, practices. for/ since, practices, questions. Adverbs, word pairs, practices. Everyday English about short answers (Question tags). [15 hrs] Review about Study materials. [5 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in developing the four skills: The skill of speaking, The skill of reading, The skill of writing, The skill of listening, Also, enable the students for the use of grammar correctly,

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	44	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	6	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3,5 and 10	LO #1, #2
	Assignments	2	10% (10)	4, 6 and 12	LO #3, #4 and #6
	Report				
Summative assessment	**Midterm Exam**	1 hr	10% (10)	7	LO #1 - #5
	Final Exam	2 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction: Review about Study materials. [2 hrs]
Week 2	Quantities, wh- questions and answers.
Week 3	Articles, reeding (about shopping).
Week 4	Vocabulary: Shopping, prices.
Week 5	Grammar: Verb patterns, making questions.
Week 6	**Mid-term Exam**
Week 7	Future: Going to/will, practices, reading (Hollywood kids).
Week 8	Grammar: hot verbs, listening, everyday English: how do you feel?.
Week 9	Grammar: What ….. like? , Comparative and superlative adjectives big, bigger, practices.
Week 10	Vocabulary: Synonyms and antonyms.
Week 11	everyday English about directions, listening and reading, practices.
Week 12	Present tense, simple present, present continuous, practices.
Week 13	Grammar: for/ since, practices, questions.

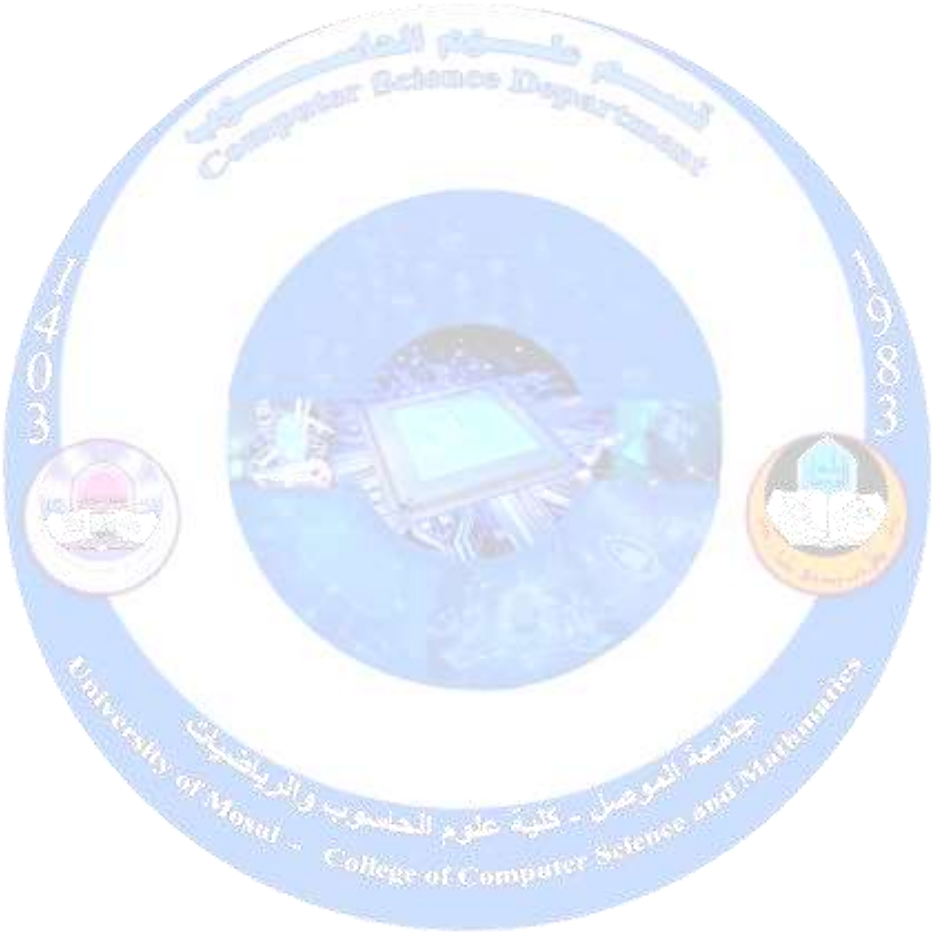
Week 14	Adverbs, word pairs, practices.
Week 15	Everyday English about short answers (Question tags).
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
	No Labs

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Headway pre-intermediate plus student's book (john and Lize Soars)	Yes
Recommended Texts	Headway pre-intermediate plus work's book	Yes
Websites	https://7esl.com/	

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.



Courses System Description

Courses System - Stage 3 and 4
2024-2025

Curriculum description for the third year

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Compilers (1) - CMCS23 F31011**
4.Available attendance forms	**Presence**
5.Course/Year	**Courses system**
6.Number of study hours (total)	**2 theoretical + 2 practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Be able to build a compiler for a (simplified) (programming) language
2. Know how to use compiler construction tools, such as generators of scanners and parsers
3. Be familiar with assembly code and virtual machines
4. Be able to define LL(1), LR(1), and SLR(1) grammars
5. Be familiar with compiler analysis and optimization techniques.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Understand the principles guiding all aspects of the compilation process.
2. Recognize the function of each of the fundamental components of a conventional compiler.
3. Demonstrate familiarity with compiler front-end concepts, such as lexical analysis, syntactic analysis, semantic analysis, type checking, symbol tables, and so on.
4. Demonstrate understanding of compiler back-end theory, such as intermediate code generation, run-time organization, code generation, optimization, data flow analysis, and so on.
5. Demonstrate the ability to implement a portion of a high-level language compiler.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods
✓ 1- Whiteboard ✓ 2- Smart board ✓ 3- Data Show Projector
Evaluation methods
✓ 1- Midterm exam ✓ 2- Quizzes ✓ 3- Reports ✓ 4- Assignments 5- Projects
C- Emotional and valuable goals ✓ 1- Deduction and analysis skills ✓ 2- Comparison skills ✓ 3- Discussion skills ✓ 4- Using the computer and the Internet ✓ 5- Fact-findings and investigation 6- Conducting research and drawing conclusions 7- Decision making
Teaching and learning methods
✓ 1- Theoretical lectures ✓ 2- laboratories ✓ 3- Fact-findings and investigation ✓ 4- Discussion groups within practical lessons
Evaluation methods
✓ 1- Written exams 2- Research projects 3- Summer discussions ✓ 4- Evaluation of assignments and discussions ✓ 5- Evaluating individual and group research
D- General and transferable skills (other skills related to employability and personal development). 1. Developing the ability to work effectively in a team. 2. Developing the ability for self-directed learning. 3. Developing the ability to generate and discuss ideas. 4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure

Weeks	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment Method
First	2	First & follow set	Constructing Parsing table	Whiteboard	-

Second	2	Disambiguating grammar	Ambiguous grammar	Data Show Projector	Homework
Third	2	Top-down Parser, and Bottom-up Parser.	Types of parsers in compiler design	Data Show Projector and Whiteboard	Quiz
Fourth	2	Shift-reduce parsers	Bottom-up Parser	Data Show Projector	Homework
Fifth	2	Simple LR parser	Bottom-up Parser	Data Show Projector	-
Sixth	2	SLR	Bottom-up Parser	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	Syntax-Directed Translation Inherited and Synthesized Attributes	Syntax-Directed Translation	Data Show Projector and Whiteboard	Homework
Ninth	2	Static and Dynamic Semantics, Semantic Errors	Semantic Analysis	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Type Checking	Semantic Analysis	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Postfix Notation, Three-Address Code, Syntax Tree	Intermediate-code Generation	Data Show Projector and Whiteboard	Homework
Twelfth	2	Issues in the design of a code generator	Intermediate-code Generation	Data Show Projector and Whiteboard	Homework
Thirteenth	2	Instruction Selection, Register Allocation, Evaluation orders	Introduction of Object Code in Compiler	Review	Review
Fourteenth	2	Code Optimization in Compiler Design	Code Optimization	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Machine Independent Code optimization in Compiler Design	Machine Independent Code optimization	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure

A. Required textbooks	Basics of Compiler Design, Torben E. Mogensen, 2009.
B. Main References (Sources)	1-The Essence of Compilers by Roben Hunter, Prentice–Hall 1999 . 2- Compilers , principles , Techniques and tools by Aho,Lam, Sethi and Ullman, 2nd Ed. Addison – Wesely , 2007.
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Database (1) - CMCS23 F31021**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. To develop data analyzing skills.
2. To understand database principles and its application fields.
3. This course deals with the basic concept of database systems.
4. This is the basic subject for all database systems and their applications.
5. To understand database management system and database models.
6. To perform one of a database system project.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Recognize general definitions of database and its characteristics.
2. List the roles of database management systems.
3. Summarize the data independence characteristic in database systems.
4. Discuss the views of the database system
5. Describe Conceptual, logical, physical levels of database system.
6. Define Network architecture and database system.
7. Identify general view of Entity Models.
8. Discuss candidate keys and focus on Primary Key.
9. Explain basics Entity-Relational model.
10. Discuss Normalization and Normal Form.
11. Identify the basic concepts of Relational Algebra.

12. Discuss ACID properties and Transactions.
13. Discuss 12 Codd's roles.
14. Revise the database principles.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- ✓ 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	General definitions of database and its characteristics.	Database System Concepts	Whiteboard	-
Second	2	The role of database management systems.	DBMS and its Components	Data Show Projector	Homework
Third	2	The data independence characteristic in database systems.	Data Independence	Data Show Projector and Whiteboard	Quiz
Fourth	2	The views of the database system.	Database Architectures	Data Show Projector	Homework
Fifth	2	Conceptual, logical, physical levels of database system.	The Three Levels of the Architecture	Data Show Projector	-
Sixth	2	Network architecture and database system.	Client-Server Architecture	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	General view of Entity Models with focus on relational database.	The Entity Relationship Data Model	Data Show Projector and Whiteboard	Homework
Ninth	2	Explain basics Entity-Relational model.	Conceptual Design with ER Model	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Explain basics Entity-Relational model.	Conceptual Design with ER Model	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Candidate keys and focus on Primary Key.	Constraints and Keys	Data Show Projector and Whiteboard	Homework
Twelfth	2	General definitions of database and its characteristics.	Database System Concepts	Data Show Projector and Whiteboard	Homework
Thirteenth		Basic concepts of Relational Algebra.	Relational Algebra	Review	Review
Fourteenth	2			Data Show Projector	Quiz

				and Whiteboard	
Fifteenth	2	Basic concepts of Relational Algebra.	Relational Algebra	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure	
A. Required textbooks	Modern Database Management Systems ,Fred R. McFadden, 10th ed , Addison –Wesly , 2015
B. Main References (Sources)	Database system concepts, by Silberschatz, Korth and Sudarshan, 7th ed, McGraw-Hill, 2019
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Software Engineering - CMCS23 F31031**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. To introduce students to the concept of software engineering and the necessary activities for producing various systems.
2. To teach students how to design software to solve complex problems by understanding software engineering methods and development phases.
3. To enable students to use the Enterprise Architect program, a UML modeling tool, to manage and design large projects through the use of diagrams for analyzing, designing, and testing large systems.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to:

1. Understanding the meaning of software engineering and its goals.
2. Understanding the various software process models and their applications.
3. Analyzing and selecting the appropriate process model for a business system.
4. Identifying and specifying the requirements for application development and create a Software Requirements Specification (SRS) document.
5. Understanding different software design techniques and architectural styles.
6. Developing and design efficient, reliable, and cost-effective software solutions.
7. Applying software testing approaches and using metrics in the software development process.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- ✓ 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Introduction	Software definition, applications and problems. Software engineering definition.	Whiteboard	-
Second	2	Software Process	The conflicting and complementary goals of SWE. Water fall Model	Data Show Projector	Homework
Third	2	Software engineering paradigms	Prototyping. Evolutionary development. Formal systems development.	Data Show Projector and Whiteboard	Quiz
Fourth	2	Software Requirements	Objectives. Requirements Engineering Process. Types of Requirements .Software Requirement Specification. Software Requirement Validation.	Data Show Projector	Homework
Fifth	2	Analysis Model	Analysis Model Types and examples .Formal Specifications. Formal methods. Formal Specification Languages.	Data Show Projector	-
Sixth	2	Software Design	Design and Quality. Software Design Levels. Fundamental Design Concepts	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	Functional independence	Definition. Cohesion and its types. Coupling and its types. Effective Modular Design.	Data Show Projector and Whiteboard	Homework
Ninth	2	Design elements	Data, Architectural and procedural design. Top-Down and Bottom-Up Design. Structured Design. Transform and Transaction Mapping	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Software Testing	Definition and Objectives. Exhaustive Testing. Test case design. Software Testing Strategies	Data Show Projector and Whiteboard	Quiz
Eleventh	2	White Box Testing	Basis path testing. Basis path method with examples. Condition testing. Data flow testing. Loop testing	Data Show Projector and Whiteboard	Homework

Twelfth	2	Black Box Testing	Black box testing techniques.	Data Show Projector and Whiteboard	Homework
Thirteenth		SW management	Software Project definition and goal.	Review	Review
Fourteenth	2	Project Scheduling	Resource management. Project Execution & Monitoring. Project Management Tools.	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Revision	Revision	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure

A. Required textbooks	Software engineering A practitioner's approach, Third Edition, Roger S. Pressman, 2005.
B. Main References (Sources)	1. Software engineering, Eighth Edition, Ian Somerville, 2007. 2. Enterprise Architect User Guide, by Geoffrey Sparks, 2009.
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Encryption - CMCS23 F31041**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Knowing the concept of cryptography and its basic components and types.
2. Knowing the types of threats that faced the transmitted messages sent by two parties.
3. Knowing the basic types of the encryption algorithms, the difference between these types, and where each type is used
4. The ability to encrypt and decrypt a text message with the most popular classic algorithms.
5. The ability to encrypt and decrypt a text message in the most modern, and simplified algorithms.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. The student should have full knowledge of basic terms related to cryptography and the types of cryptography.
2. The student should have full knowledge of the types of threats that may face the data and distinguish between every type.
3. The ability of the student to encrypt / decrypt any text message in the famous classic algorithms (transposition algorithms).
4. The ability of the student to encrypt / decrypt any text message in the famous classic algorithms (substitution algorithms).
5. The student should have full knowledge of stream cipher and random number generator using the linear feedback shift registers.

6. The student should have full knowledge of stream cipher and random number generator using the non-linear feedback shift registers.
7. The student should have full knowledge of number theory and can calculates the important theory which used in modern algorithms.
8. The students should know the meaning of block cipher algorithms and have a deep idea about simplified one.
9. The students should know the meaning of public key cipher algorithms and decode using the simple encryption methods (RSA).

B - Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- ✓ 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure

Weeks	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment Method
First	2	Introduction to Cryptography history	Introduction, Terms and Basic Concepts	Whiteboard	-
Second	2	Study techniques for the old and some new techniques	Classical Encryption Techniques (Transposition & ((Substitution)	Data Show Projector	Homework
Third	2	What is about the new methods?	Modern Encryption Techniques	Data Show Projector and Whiteboard	Quiz
Fourth	2	Some properties like Symmetric & Asymmetric	Symmetric Crypto Primitives	Data Show Projector	Homework
Fifth	2	All methods that came under the term of Stream Cipher	Stream Ciphers	Data Show Projector	-
Sixth	2	Many subjects under this title	Introduction to Number Theory	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	A new way for cryptography	Principles of Public key Cryptography and Cryptosystem	Data Show Projector and Whiteboard	Homework
Ninth	2	What is the most important algorithm?	Public key Cryptography and RSA	Data Show Projector and Whiteboard	Prepare a report
Tenth	2			Data Show Projector and Whiteboard	Quiz
Eleventh	2	The algorithm in detail.	The RSA algorithm	Data Show Projector and Whiteboard	Homework
Twelfth	2	Specify what is block cipher	Block Ciphers	Data Show Projector	Homework

				and Whiteboard	
Thirteenth		The algorithm DES in detail	Data Encryption Standard, DES	Review	Review
Fourteenth	2	Some other important requirements	Authentication Messages and Requirements	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Very important techniques	Hash Functions Digital Signature	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure

A. Required textbooks	Cryptography and Network Security: Principles and Practice" , (2nd Ed.), William Stallings, Prentice-Hall, Inc., 1999
B. Main References (Sources)	Cryptography and Network Security: Principles and Practice, (7th Ed.) , William Stallings , Prentice-Hall, Inc., 2016
C. Recommended books and references (scientific journals, reports, etc.)	Computation, Cryptography, and Network Security", (1st ed.), Nicholas J. Daras & Michael Th. Rassias, Springer, 2015
D. Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Principles of Management - CMCS23 F31051**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical (2 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Introduce students to the concept and principles of management.
2. Familiarize students with different schools of management thought.
3. Explain key management theories and their applications.
4. Equip students with knowledge of the fundamentals and practices of administrative work.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Demonstrate an understanding of the fundamental concepts and principles of management.
2. Identify and compare different schools of management thought.
3. Analyze key management theories and their practical applications.
4. Apply basic administrative principles and practices in real-world scenarios.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

✓ 1- Midterm exam ✓ 2- Quizzes ✓ 3- Reports ✓ 4- Assignments 5- Projects
C- Emotional and valuable goals ✓ 1- Deduction and analysis skills ✓ 2- Comparison skills ✓ 3- Discussion skills ✓ 4- Using the computer and the Internet ✓ 5- Fact-findings and investigation 6- Conducting research and drawing conclusions 7- Decision making
Teaching and learning methods
✓ 1- Theoretical lectures 2- laboratories ✓ 3- Fact-findings and investigation 4- Discussion groups within practical lessons
Evaluation methods
✓ 1- Written exams 2- Research projects 3- Summer discussions ✓ 4- Evaluation of assignments and discussions 5- Evaluating of individual and group research
D- General and transferable skills (other skills related to employability and personal development). 1. Developing the ability to work effectively in a team. 2. Developing the ability for self-directed learning. 3. Developing the ability to generate and discuss ideas. 4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure

Weeks	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment Method

First	2	تعريف الادارة والمدير، مداخل دراسة الادارة، نشاطات المنشأة (مجالات ادارة الاعمال)	طبيعة الإدارة ومهمات المدير	Whiteboard	-
Second	2	حجم المنظمة ، تخصص الموارد البشرية وصعوبة ، العمل، تغيير مكانة الافراد ، تدخل الدولة في شؤون المنظمة، التغيير المتسارع	التحديات التي تواجهها الادارة المعاصرة	Data Show Projector	Homework
Third	2	انماط السلوك الاداري، المهارات الادارية ،مصادر المهارات الادارية، التفاوت في العمل الاداري امكانية نقل المهارات الادارية	مهمات المدير	Data Show Projector and Whiteboard	Quiz
Fourth	2	الادوار التفاعلية، الادوار المعلوماتية، الادوار القرارية	ادوار المدير	Data Show Projector	Homework
Fifth	2	التخطيط واتخاذ القرار، التنظيم، القيادة والتحفيز، الرقابة	وظائف المدير	Data Show Projector	-
Sixth	2	الادارة العليا، الادارة الوسطى، الادارة المباشرة والاشرافية	انواع المدراء	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	مدرسة الادارة العلمية، مدرسة التقسيمات الادارية، المدرية البيروقراطية	المدرسة التقليدية الكلاسيكية	Data Show Projector and Whiteboard	Homework
Ninth	2	دراسة هاوثورن والتون مايو، دراسة فولت، جستربانرد دوكلاس و ماكريكر ونظرية س و ص	المدرسة الانسانية	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	نظرية المنظومات المفتوحة، الادارة الكمية ، وليام اوجي ونظرية z الادارة اليابنية،الادارة الموقفية	مدرسة الاتجاهات المعاصرة	Data Show Projector and Whiteboard	Quiz
Eleventh	2	تركيبة السطح البيئي، البيئة العمومية، البيئة الخاصة، فشل المنظمة في قراءة مؤشرات البيئة	الادارة وبيئتها	Data Show Projector and Whiteboard	Homework
Twelfth	2	القطاع الاقتصادي، القطاع التكنلوجي، القطاع الاجتماعي، القطاع الحكومي	مكونات البيئة العامة	Data Show Projector and Whiteboard	Homework
Thirteenth		الزبائن، الموردون، المنافسون، الجماعات	مكونات البيئة الخاصة	Review	Review

		والاجهزة الناظمة، التكنلوجيا ذات العلاقة، الموارد البشرية			
Fourteenth	2	طبيعة الفحص البيئي، البيئة المتحركة والمستقرة، اجراءات الفحص البيئي	استقصاء حدود البيئة	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	غرض المنظمة ورسالتها، الاهداف والغايات، انواع الاهداف المنظمية، اهمية الاهداف المنظمية ، متطلبات تحديد الاهداف	الاهداف المنظمية	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure

A. Required textbooks	مبادئ الادارة للدكتور شوقي ناجي جواد
B. Main References (Sources)	مبادئ ادارة الاعمال للكتور خليل الشماع
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Operation Research - CMCS123 F31061**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**3 theoretical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Introduce students to the nature of Operations Research and its historical development.
2. Familiarize students with Operations Research tools, including Linear Programming, Transportation Models, Inventory Models, and others.
3. Enable students to formulate a Linear Programming model.
4. Equip students with the skills to solve Linear Programming models using the Graphical Method, Simplex Method, and Big-M Method.
5. Introduce students to the Dual Model (or Dual Problem).
6. Enable students to solve the Dual Model using the Dual Simplex Method.
7. Familiarize students with Transportation Models and the process of formulating a transportation model.
8. Enable students to solve Transportation Models using the North-West Corner Method and the Least Cost Method.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Explain the nature and historical development of Operations Research.
2. Identify and utilize key Operations Research tools, including Linear Programming, Transportation Models, and Inventory Models.
3. Formulate Linear Programming models for real-world problems.
4. Solve Linear Programming problems using the Graphical Method, Simplex Method, and Big-M Method.
5. Describe the concept of the Dual Model and its significance.

6. Apply the Dual Simplex Method to solve dual problems.
7. Develop and analyze Transportation Models for optimization.
8. Solve Transportation Models using the North-West Corner Method and the Least Cost Method.

B- Course specific skill objectives

- ✓ B1 - Theoretical
- B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- 2- laboratories
- ✓ 3- Fact-findings and investigation
- 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	مقدمة عن بحوث العمليات، تعريف بحوث العمليات، الهدف من دراسة بحوث العمليات، مراحل دراسة بحوث العمليات، أدوات بحوث العمليات، تطبيقات بحوث العمليات	مقدمة عن بحوث العمليات	Whiteboard	-
Second	2	مقدمة عن البرمجة الخطية، تعريف البرمجة الخطية، الصيغة العامة للبرمجة الخطية، كيفية تكوين أنموذج برمجة خطية	نموذج البرمجة الخطية	Data Show Projector	Homework
Third	2	مقدمة عن طرائق حل البرمجة الخطية، شرح للطريقة الاولى وهي الطريقة البيانية مع اعطاء امثلة وحلها شرح الحالات الخاصة لمسائل البرمجة الخطية عند حلها بالطريقة البياني،إعطاء مثال لكل حالة من هذه الحالات	طرائق حل نماذج البرمجة الخطية	Data Show Projector and Whiteboard	Quiz
Fourth	2	مقدمة عن طريقة السمبلكس، خطوات الحل بطريقة السسمبلكس، إعطاء أمثلة وحلها بطريقة السمبلكس	الطريقة المبسطة او طريقة السمبلكس	Data Show Projector	Homework
Fifth	2	مقدمة عن طريقة M الكبيرة، خطوات الحل بـطريقة M الكبيرة، إعطاء أمثلة وحلها بطريقة M الكبيرة	طريقة M الكبيرة	Data Show Projector	-
Sixth	2	مقدمة عن النموذج الثنائي، مزايا النموذج الثنائي، خطوات تحويل نموذج البرمجة الخطية الى نموذج ثنائي، أمثلة لكيفية تحويل نموذج البرمجة الخطية الى النموذج الثنائي	النموذج الثنائي (أو النموذج المقابل)	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	مقدمة عن طريقة السمبلكس الثنائية، خطوات طريقة السمبلكس الثنائية، إعطاء أمثلة وحلها بطريقة السمبلكس الثنائية	طريقة السمبلكس الثنائية	Data Show Projector and Whiteboard	Homework
Ninth	2	مقدمة عن نماذج النقل، كيفية تكوين نموذج النقل، إعطاء	نماذج النقل	Data Show Projector and	Prepare a report

		أمثلة لتوضيح آلية تكوين نموذج النقل		Whiteboard	
Tenth	2			Data Show Projector and Whiteboard	Quiz
Eleventh	2	مقدمة عن طرائق حل نماذج النقل	طرائق حل نماذج النقل	Data Show Projector and Whiteboard	Homework
Twelfth	2	شرح خطوات طريقة الركن الشمالي الغربي	طرائق حل نماذج النقل	Data Show Projector and Whiteboard	Homework
Thirteenth		إعطاء أمثلة وحلها بطريقة الركن الشمالي الغربي	طرائق حل نماذج النقل	Review	Review
Fourteenth	2	مقدمة عن طريقة أقل الكلف، شرح خطوات طريقة أقل الكلف	طريقة أقل الكلف	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	إعطاء أمثلة وحلها بطريقة أقل الكلف	طريقة أقل الكلف	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure

A. Required textbooks	1. مدخل الى بحوث العمليات /حامد الشمرتي وعلي الزبيدي
B. Main References (Sources)	1. بحوث العمليات / حمدي طه (مترجم) 2. بحوث العمليات /عبد ذياب جزاع
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Compiler2 - CMCS24 F32011**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Be able to build a compiler for a (simplified) (programming) language
2. Know how to use compiler construction tools, such as generators of scanners and parsers
3. Be familiar with assembly code and virtual machines
4. Be able to define LL(1), LR(1), and SLR(1) grammars
5. Be familiar with compiler analysis and optimization techniques.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Understand the principles guiding all aspects of the compilation process.
2. Recognize the function of each of the fundamental components of a conventional compiler.
3. Demonstrate familiarity with compiler front-end concepts, such as lexical analysis, syntactic analysis, semantic analysis, type checking, symbol tables, and so on.
4. Demonstrate understanding of compiler back-end theory, such as intermediate code generation, run-time organization, code generation, optimization, data flow analysis, and so on.
5. Demonstrate the ability to implement a portion of a high-level language compiler.

B- Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- ✓ 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	First & follow set	Constructing Parsing table	Whiteboard	-
Second	2	Disambiguating grammar	Ambiguous grammar	Data Show Projector	Homework
Third	2	Top-down Parser, and Bottom-up Parser.	Types of parsers in compiler design	Data Show Projector and Whiteboard	Quiz
Fourth	2	Shift-reduce parsers	Bottom-up Parser	Data Show Projector	Homework
Fifth	2	Simple LR parser	Bottom-up Parser	Data Show Projector	-
Sixth	2	SLR	Bottom-up Parser	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	Syntax-Directed Translation Inherited and Synthesized Attributes	Syntax-Directed Translation	Data Show Projector and Whiteboard	Homework
Ninth	2	Static and Dynamic Semantics, Semantic Errors	Semantic Analysis	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Type Checking	Semantic Analysis	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Postfix Notation, Three-Address Code, Syntax Tree	Intermediate-code Generation	Data Show Projector and Whiteboard	Homework
Twelfth	2	Issues in the design of a code generator	Intermediate-code Generation	Data Show Projector and Whiteboard	Homework
Thirteenth		Instruction Selection, Register Allocation, Evaluation orders	Introduction of Object Code in Compiler	Review	Review
Fourteenth	2	Code Optimization in Compiler Design	Code Optimization	Data Show Projector and Whiteboard	Quiz

Fifteenth	2	Machine Independent Code optimization in Compiler Design	Machine Independent Code optimization	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure

A. Required textbooks	Basics of Compiler Design, Torben E. Mogensen, 2009.
B. Main References (Sources)	1-The Essence of Compilers by Roben Hunter, Prentice–Hall 1999 . 2- Compilers , principles , Techniques and tools by Aho,Lam, Sethi and Ullman, 2nd Ed. Addison – Wesely , 2007.
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Artificial Intelligence - CMCS24 F32021**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. To give a thorough understanding of AI principles, algorithms, and methods.
2. To gain practical experience in creating AI systems.
3. To cover a wide range of subjects and provide an introduction to AI.
4. To go deeper into issues like heuristic and blind search techniques.
5. Investigating inference rules and proof methodologies, predicate logic, propositional logic, and semantic networks, Conceptual graphs and Frames as models and representations of knowledge
6. To successfully use intelligent systems, such as reasoning engines and expert systems and understanding of artificial neural networks.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Understand the underlying ideas and fundamental concepts of artificial intelligence.
2. Use and apply search algorithms by use heuristic and blind techniques.
3. Create and use knowledge representation in intelligent systems.
4. List representation and arithmetic operator notation
5. Representing a non-deterministic automata in simulation.
6. Evaluate and assess the performance of artificial intelligence .
7. Design Expert system.
8. Learn about artificial neural networks.

B- Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- ✓ 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Introduction to Artificial Intelligence. Languages and Environments for AI. AI Application Areas. Characteristics of Artificial Intelligence. Data, Information, and Knowledge.	Introduction to Artificial Intelligence	Whiteboard	-
Second	2	Search Methods. Structures for state space. State Space represented of problems. State Space Search.	Search Methods	Data Show Projector	Homework
Third	2	Traveling Salesperson Problem. Water Jug Problem. Coins Problem. sliding-tile puzzle problem.	State Space Search Problem	Data Show Projector and Whiteboard	Quiz
Fourth	2	Blind search. Depth-First Search. Depth first search (DFS)method. Depth first search(DFS) algorithm. Depth first search(DFS) problems. Advantages of DFS. disadvantages of DFS.	Systematic Search (Blind search)	Data Show Projector	Homework
Fifth	2	Breadth first search(BFS). Breadth first search (BFS)method. Breadth first search(BFS) algorithm. Breadth first search(BFS) problems. Advantages of BFS disadvantages of BFS.	Systematic Search (Blind search)	Data Show Projector	-
Sixth	2	Hybrid first search (HFS). Hybrid first search (HFS) method. Hybrid first search (HFS) algorithm. Hybrid first search (HFS) problems. Advantages of HFS disadvantages of HFS.	Systematic Search (Blind search)	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam

Eighth	2	Heuristic Search Techniques. Heuristic search methods. Generate and test. Hill climbing search. Hill climbing search Algorithm. Problems with hill climbing. To solving problems for hill climbing search. Best first search. A* algorithm	Heuristic Search	Data Show Projector and Whiteboard	Homework
Ninth	2	Knowledge Representation. Logic Representation. Propositional Logic. Predicate Logic.	Knowledge Representation	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Some examples of knowledge representation. Clause form. Convert to clause form.	Propositional Logic And Predicate Logic	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Network Representation. Semantic Network. Examples of Semantic Network. Abstract objects.	Network Representation	Data Show Projector and Whiteboard	Homework
Twelfth	2	Conceptual Graph. Operations on Conceptual Graphs. Negation of conceptual graph. Representing propositions by conceptual graph.	Network Representation	Data Show Projector and Whiteboard	Homework
Thirteenth		Frames. Some examples to Network Representation by Frames. Advantages and disadvantages of knowledge representation methods	Network Representation Frames	Review	Review
Fourteenth	2	Expert System. What are Expert Systems(ES). Architecture of Expert System. Expert System classes.	Expert System	Data Show Projector and Whiteboard	Quiz

Fifteenth	2	Artificial Neural Networks (ANNs). Introduction for ANNs. Biological Neural Network. Artificial Neuron. Learning in Neural Networks. Properties of A.N.N. Important A.N.N. parameter.	Artificial Neural Networks	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure

A. Required textbooks	Artificial Intelligence Aguide for Thinking Humans(Melanie Matchell, 2019).
B. Main References (Sources)	• AI Super Power(Kai- Fu Lee, 2018). • Fundamentals of Artificial Intelligence Book by K. R. Chowdhary, 2020
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Database (2) - CMCS24 F32031**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Introduce students to the concept of databases and their purpose in computer science.
2. Provide an overview of database management systems (DBMS).
3. Teach students how to program databases using SQL.
4. Explain the logical and physical representation of data.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Understand the concept of databases and their significance in computer science.
2. Demonstrate knowledge of database management systems (DBMS) and their functions.
3. Develop the ability to write SQL queries to program and manage databases.
4. Understand and apply the principles of logical and physical data representation.

B- Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods
✓ 1- Midterm exam ✓ 2- Quizzes ✓ 3- Reports ✓ 4- Assignments 5- Projects
C- Emotional and valuable goals ✓ 1- Deduction and analysis skills ✓ 2- Comparison skills ✓ 3- Discussion skills ✓ 4- Using the computer and the Internet ✓ 5- Fact-findings and investigation 6- Conducting research and drawing conclusions 7- Decision making
Teaching and learning methods
✓ 1- Theoretical lectures ✓ 2- laboratories ✓ 3- Fact-findings and investigation ✓ 4- Discussion groups within practical lessons
Evaluation methods
✓ 1- Written exams 2- Research projects 3- Summer discussions ✓ 4- Evaluation of assignments and discussions ✓ 5- Evaluating of individual and group research
D- General and transferable skills (other skills related to employability and personal development). 1. Developing the ability to work effectively in a team. 2. Developing the ability for self-directed learning. 3. Developing the ability to generate and discuss ideas. 4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure

Weeks	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment Method

First	2	Giving an overview of concepts that dedicated for DBMSs	Database System Concepts Overview	Whiteboard	-
Second	2	Detailed introduction of LDBMS's and introducing the relational model.	Logical database Design and the Relational Database Design	Data Show Projector	Homework
Third	2	Transforming EERD Into Relations - Part One	Transforming EER into Relations	Data Show Projector and Whiteboard	Quiz
Fourth	2	Transforming EER Into Relations - Part Two		Data Show Projector	Homework
Fifth	2		Review and Quiz	Data Show Projector	-
Sixth	2	Defining what are the anomalies that might be found in relations and how it affects the integrity and consistency of data,	Introduction to Normalization	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	First, Second, and Third Normal forms, Decomposition and FDs Preservation	Introduction to Normalization	Data Show Projector and Whiteboard	Homework
Ninth	2	Physical Database Design and Denormalization- Part 1	Physical Database Design and Denormalization	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Physical Database Design and Denormalization- Part 2	Physical Database Design and Denormalization	Data Show Projector and Whiteboard	Quiz
Eleventh	2		Mid-Term Quiz	Data Show Projector and Whiteboard	Homework
Twelfth	2	Boyce-Codd Normal Form	Additional Normal Forms	Data Show Projector and Whiteboard	Homework
Thirteenth		Multivalued Dependency and Fourth Normal Form	Additional Normal Forms	Review	Review
Fourteenth	2	Concurrency, Concurrency Problems Locking, Deadlock	Concurrency, Concurrency Problems Locking, Deadlock	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Transaction Management, ACID properties	Transaction Management, ACID properties	Data Show Projector	Project Discussion

				and Whiteboard	

11. Infrastructure	
A. Required textbooks	Hoffer, J. A., V. Ramesh, Heikki Topi. (2011). Modern Database Management, 10th Edition: Pearson Education India.
B. Main References (Sources)	Avi Silberschatz, Henry F. Korth and S. Sudarshan (2019) . Database System Concepts, 7th Edition: McGraw-Hill.
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Digital Signal Processing - CMCS24 F32051**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 Tutorial (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Provide students with a comprehensive understanding of various topics related to digital signal processing.
2. Introduce the fundamentals of digital signal processing and its key components.
3. Explain the basic system components involved in digital signal processing.
4. Teach students about different types of signals and operations in digital signal processing.
5. Introduce concepts of transformations and filtering techniques used in signal processing.
6. Cover other Core topics related to digital signal processing.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Demonstrate a comprehensive understanding of digital signal processing (DSP) concepts and techniques.
2. Identify and explain the key components of digital signal processing systems.
3. Analyze and apply different types of signals and operations in DSP.
4. Apply transformations and filtering techniques in signal processing.
5. Understand and explain other Core topics related to digital signal processing.

B- Course specific skill objectives

- ✓ B1 - Theoretical
- B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- 2- laboratories
- ✓ 3- Fact-findings and investigation
- 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Analog, Digital, ASP & DSP, Roots of DSP, Advantages & Disadvantages	Introduction to DSP	Whiteboard	-
Second	2	Input, Output, ADC, DCA, LPF, Signal-Conditioning Circuit	DSP System General Model	Data Show Projector	Homework
Third	2	Deterministic, Non-deterministic, Multi-Channel, Multi-Dimensional, Applications, A/D and D/A Conversion, Quantization Error, Representing Signal	Categorization of Signals	Data Show Projector and Whiteboard	Quiz
Fourth	2	Step, Impulse, Signum, Exponential, Ramp, Parabolic, Rectangular, Triangular, Sinusoidal	Types of Signals	Data Show Projector	Homework
Fifth	2	Scaling, Addition, Subtraction, Multiplication, Shifting, Reversal	Basic Operations on Signals	Data Show Projector	-
Sixth	2	Sketching the Operations	Other Operations on Signals	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	Static, Dynamic, Causal, Non-Causal, Anti-Causal, Bounded, Unbounded, Linear, Nonlinear	DSP Systems	Data Show Projector and Whiteboard	Homework
Ninth	2	Linear, Circular, By Equation, By Table	Convolution	Data Show Projector and Whiteboard	Prepare a report
Tenth	2			Data Show Projector and Whiteboard	Quiz
Eleventh	2		Mid-Term Quiz	Data Show Projector and Whiteboard	Homework

Twelfth	2	Standard, Normalized	Correlation	Data Show Projector and Whiteboard	Homework
Thirteenth		Types, Operations	Complex Numbers	Review	Review
Fourteenth	2	Conversion From Spatial to Frequency Domain	Discrete Fourier Transform	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Conversion From Frequency to Spatial Domain	Discrete Fourier Transform & Its Inverse	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure

A. Required textbooks	Khan, M. N., Hasnain, S. K., & Jamil, M. (2016). Digital Signal Processing: A Breadth-first Approach. Stylus Publishing, LLC.
B. Main References (Sources)	Antoniou, A. (2006). Digital signal processing. Toronto, Canada: McGraw-Hill.
C. Recommended books and references (scientific journals, reports, etc.)	Tan, L., & Jiang, J. (2018). Digital signal processing: fundamentals and applications. Academic Press.
D. Electronic references, websites, ...	Internet Resources.

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Operating Systems (1)- CMCS24 F32061**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 Practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. This course illustrates the concepts of operating systems.
2. how to design Operating Systems and install.
3. To describe the operational and practical behavior.
4. Processes and methods of scheduling between them.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Role and purpose of the operating system.
2. History of operating system development.
3. Functionality of typical operating systems.
4. Structuring methods(monolithic, layered, modular, micro kernel models)
5. Device organization
6. Interrupt: methods and implementations
7. Concept of user/system state and protection ,transition to kernel mode
8. Process
9. Schedulers and policies
10. Preemptive and non-preemptive scheduling.

B- Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- whiteboard
- ✓ 2- Smart board
- ✓ 3- Data projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- ✓ 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Introduction, what is an operating system.	Introduction	Whiteboard	-
Second	2	Batch systems, Time-sharing system, Personal computer systems, Parallel systems, Real-time systems, Distributed systems.	Types of Operating Systems	Data Show Projector	Homework
Third	2	Computer system structures.	Computer system structures.	Data Show Projector and Whiteboard	Quiz
Fourth	2	Computer system operation, Hardware protection, Operating system structures.	Operating System Structure	Data Show Projector	Homework
Fifth	2	Operating system services, System calls, System programs.	Operating system services	Data Show Projector	-
Sixth	2	Introduction, what is an operating system.	Introduction	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	Process concept, Process scheduling.	Process	Data Show Projector and Whiteboard	Homework
Ninth	2	Cooperating processes, Interprocess communication.	Interprocess communication	Data Show Projector and Whiteboard	Prepare a report
Tenth	2			Data Show Projector and Whiteboard	Quiz
Eleventh	2	CPU scheduling, basic concepts, scheduling criteria.	CPU Scheduling	Data Show Projector	Homework

				and Whiteboard	
Twelfth	2	Scheduling algorithms, FSFC, SJF.	Scheduling algorithms	Data Show Projector and Whiteboard	Homework
Thirteenth		Scheduling algorithms, Priority scheduling, Round robin.	Scheduling algorithms	Review	Review
Fourteenth	2	Multilevel queue scheduling, multilevel feedback queues scheduling multiple process scheduling.	Scheduling algorithms	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Review	Review	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure

A. Required textbooks	A. Silberschatz, P. B. Galvin, and G. Gagne, *Operating System Concepts*, 9th ed., USA: John Wiley & Sons, Inc., 2013.
B. Main References (Sources)	
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Computational Mathematics - CMCS24 F32071**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 Practical + 1 Tutorial (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Introduce students to the main concepts of Computational Mathematics.
2. Provide an understanding of basic topics such as points, lines, and circles.
3. Explain coordinate systems and their applications in computational mathematics.
4. Teach students about 2D and 3D transformations.
5. Introduce the Line Drawing Algorithm and its practical applications.
6. Explain the Circle Derivation Algorithm and its implementation.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Understand the fundamental concepts of Computational Mathematics, including points, lines, and circles.
2. Apply knowledge of coordinate systems in computational mathematics.
3. Demonstrate the ability to perform 2D and 3D transformations.
4. Implement and apply the Line Drawing Algorithm in practical scenarios.
5. Derive and apply the Circle Derivation Algorithm in computational tasks.

B- Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- whiteboard
- ✓ 2- Smart board
- ✓ 3- Data projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- ✓ 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Image and Objects Image representation Pixel Coordinates Points and Vectors	Introduction	Whiteboard	-
Second	2	Figure, subplot, grid on, title, xlabel , ylabel, legend, line	Graphics in MATLAB	Data Show Projector	Homework
Third	2	Bresenham Line Drawing Algorithm programs	Bresenham Line Drawing Algorithm	Data Show Projector and Whiteboard	Quiz
Fourth	2	Execute programs	Bresenham Line Drawing Algorithm	Data Show Projector	Homework
Fifth	2	MidPoint Circle Algorithm programs	MidPoint Circle Algorithm	Data Show Projector	-
Sixth	2	Translation	2D Transformations	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	Matrix representation	2D Transformations	Data Show Projector and Whiteboard	Homework
Ninth	2	Scaling	2D Transformations	Data Show Projector and Whiteboard	Prepare a report
Tenth	2			Data Show Projector and Whiteboard	Quiz
Eleventh	2	Rotation,	2D Transformations	Data Show Projector and Whiteboard	Homework
Twelfth	2	Execute programs	2D Transformations	Data Show Projector and Whiteboard	Homework
Thirteenth		Shear	2D Transformations	Review	Review
Fourteenth	2	Reflection,	2D Transformations	Data Show Projector and Whiteboard	Quiz

Fifteenth	2	House, flags	Draw different shapes	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure	
A. Required textbooks	Fundamentals of Computer Graphics, by Peter Shirley and others
B. Main References (Sources)	
C. Recommended books and references (scientific journals, reports, etc.)	
D. Electronic references, websites, ...	

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**English Language (3) - CMCS23 F32041**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical (2 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Introduce students to the present tense, past tense, and future tense in English grammar.
2. Teach additional grammar concepts to improve overall language proficiency.
3. Enhance students' reading skills with a focus on understanding texts related to computer concepts.
4. Improve students' writing skills, emphasizing clarity and structure in writing, particularly in relation to computer-related topics.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

1. Demonstrate a solid understanding and correct usage of present, past, and future tenses in writing and speaking.
2. Apply additional grammar concepts to enhance overall language proficiency.
3. Improve reading comprehension skills, especially in understanding texts related to computer concepts.
4. Develop and produce clear, structured written content with an emphasis on computer-related topics.

B- Course specific skill objectives

- ✓ B1 - Theoretical
- B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- whiteboard
- ✓ 2- Smart board
- ✓ 3- Data projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- 2- laboratories
- ✓ 3- Fact-findings and investigation
- 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- 5- Evaluating of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Simple,perfect,continouse,perfect continouse tense	Present Tense	Whiteboard	-
Second	2	Simple-perfect-continouse-perfect continouse	Past tense	Data Show Projector	Homework
Third	2	Simple and complex	Future	Data Show Projector and Whiteboard	Quiz
Fourth	2	Doing the right thing	unite	Data Show Projector	Homework
Fifth	2	How to make a question and negative	unite	Data Show Projector	-
Sixth	2	Talking about yourself	unite	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	The difference between have got and has got	unite	Data Show Projector and Whiteboard	Homework
Ninth	2	The difference between should and must	unite	Data Show Projector and Whiteboard	Prepare a report
Tenth	2			Data Show Projector and Whiteboard	Quiz
Eleventh	2	How to use I think and do not think	unite	Data Show Projector and Whiteboard	Homework
Twelfth	2	How not to behave badly abroad	unite	Data Show Projector and Whiteboard	Homework
Thirteenth		Listening and speaking	unite	Review	Review
Fourteenth	2	Request and offers	unite	Data Show Projector	Quiz

				and Whiteboard	
Fifteenth	2	Grammar	unite	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure	
A. Required textbooks	Oxford English for Computing:teacher's Book, by P. Charles Brown and Keith Boeckner
B. Main References (Sources)	English for Computer Science by Norma D. Mullen and P. Charles Brown, Oxford University Press
C. Recommended books and references (scientific journals, reports, etc.)	Scientific Writing for Computer Science Students by Wilhelmiina Hamalainen
D. Electronic references, websites, ...	

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum description for the fourth year

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science and Mathematics / Computer Science Department**
3.Course Name/Code	**Operating system 2- CMCS23 F41011**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 theoretical + 2 practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

6. The main objective of this course is to introduce students to what a process is.
7. The various techniques of the functions of operating systems, for example, process synchronization and its problem.
8. Examples of solutions to that problem are (Peterson's) algorithm and the use of hardware to solve the problem (Semaphore).
9. This course focuses on reviewing the case of Deadlocks and how to prevent or avoid their occurrence in multi-process processors.
10. Memory management, secondary storage management and I/O management.
11. This course focuses more on the knowledge needed for designers and developers of operating systems. This will leave room for the expansion of accurate theoretical knowledge.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to learn:

6. Process
7. Synchronization problem
8. Dead lock handling & prevention
9. Characterization and conditions
10. Introduction to Memory
11. Memory Management
12. RAID Structure
13. Disk Structure Preemptive and non-preemptive scheduling.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 – Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show projector

Evaluation methods

- ✓ 1- Midterm exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and valuable goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- ✓ 5- Evaluating of individual and group research

D- **General and transferable skills (other skills related to employability and personal development).**

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure

Weeks	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment Method
First	2	Introduction to process	Introduction	Whiteboard	-
Second	2	Synchronization problem The Critical-Section Problem	Synchronization problem	Data Show Projector	Homework
Third	2	Examples of Synchronization Solution (Peterson's)	Synchronization Solution By Algorithm	Data Show Projector and Whiteboard	Quiz
Fourth	2	Examples of Synchronization Solution (Semaphore)	Synchronization Solution By Hardware	Data Show Projector	Homework
Fifth	2	Monitors Deadlock Characterization	The Deadlock	Data Show Projector	-
Sixth	2	Methods for Handling Deadlocks Deadlock Prevention	Handling Deadlocks	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	Deadlock Avoidance Deadlock Detection and Recovery from Deadlock	The Deadlock Detection	Data Show Projector and Whiteboard	Homework
Ninth	2	Introduction to Memory	Memory Management	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Management Swapping and Contiguous Memory Allocation Paging and Structure of the Page	Swapping and Contiguous Memory	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Table Segmentation, Overview of Mass-Storage	Table Segmentation	Data Show Projector and Whiteboard	Homework
Twelfth	2	RAID Structure Stable-Storage Implementation,	RAID Structure	Data Show Projector and Whiteboard	Homework
Thirteenth	2	Disk Structure and Disk Attachment Disk Scheduling	Disk Structure	Review	Review
Fourteenth	2	Disk Management The Critical-Section problem	Disk Management	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Synchronization Examples	Synchronization Examples	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure	
A- Required textbooks	Petrson, Operating System Concepts, Prentice Hall
B- Main References (Sources)	• Tanenbaum, Andrew S. Modern Operating Systems. Prentice Hall. • Hantelmann, Fred. Linux Start-up Guide. Springer.
C- Recommended books and references (scientific journals, reports, etc.)	• Kernighan, Brian W. e Ritchie, Dennis M. The C programming Language (ANSI C). Prentice-Hall. • Robbins, Kay A. Practical UNIX Programming. A Guide to Concurrency, Communication, and Multithreading. Prentice-Hall.

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Computer Networks- CMCS23 F41031**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**3 theoretical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Introduce students to the concept of computer networks.
2. Provide them with the necessary information about the types of computer networks
3. How the networks are work.
4. The infrastructure and the designing of Networks.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to:

1. Understand the key concepts of computer networks, types, models and how networks are works.
2. Understand the transmission Media types: Guided media: UTP, STP, Coaxial Unguided media: wireless, IR, Satellite, and Bluetooth.
3. Understand the Networking Devices, Hub, Switch, and Router.
4. Recognize the seven layers of the OSI model with their tasks.
5. Recognize the layers of the TCP/IP with their tasks.
6. Understand Networks addressing, IP addresses, Mac address and port address.
7. Understand The IP addresses and its types: classless and classful.
8. Understand the Special Addresses, Private Addresses.

B - Course specific skill objectives

- ✓ B1 – Theoretical
- B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Projector

Evaluation methods

- ✓ 1- Midterm Exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 4- projects

C- Emotional and value goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- 2- laboratories
- ✓ 3- Fact-findings and investigation
- 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- ✓ 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluating assignments and discussions
- ✓ 5- Evaluation of individual and group research

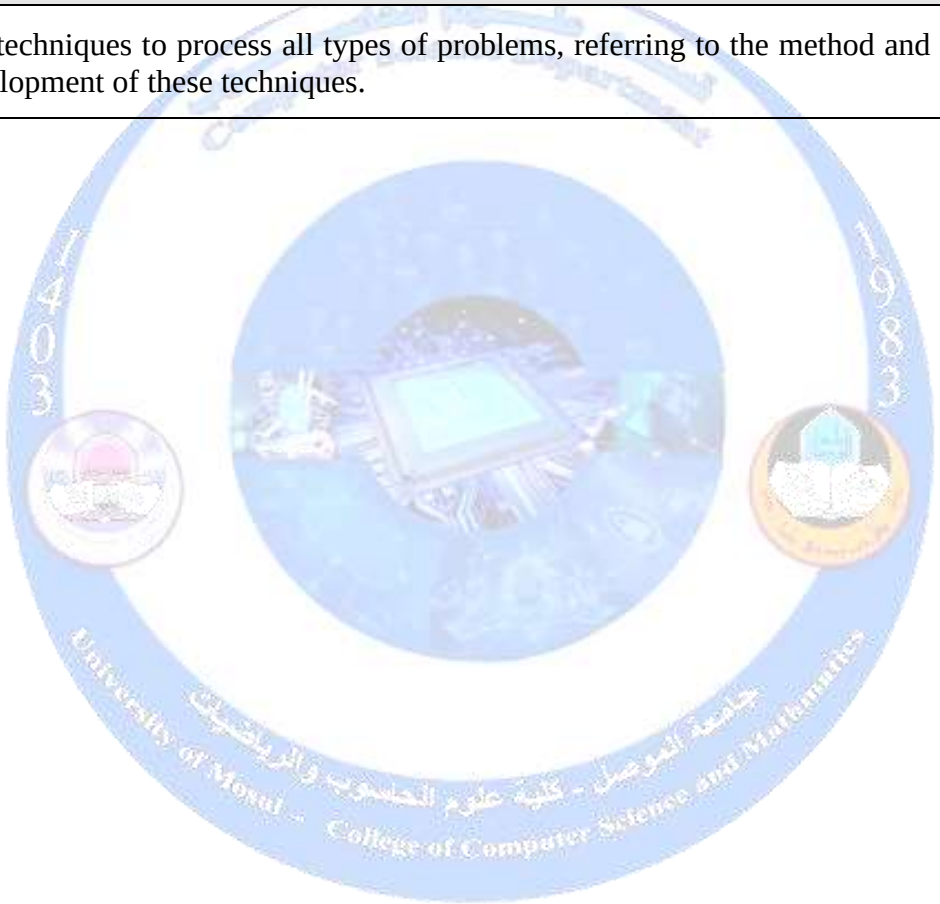
D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Computer Networks Definition, types, Models	Introduction	Whiteboard	-
Second	2	Guided media: UTP, STP, Coaxial	Transmission Media-1-	Data Show Projector	Homework
Third	2	Unguided media: wireless, IR, Satellite, Bluetooth	Transmission Media-2-	Data Show Projector and Whiteboard	Quiz
Fourth	2	State the seven layers of the OSI model with their tasks.	OSI Model	Data Show Projector	Homework
Fifth	2	State the layers of the TCP/IP with their tasks	TCP/IP	Data Show Projector	-
Sixth	2	Hub, Switch, Router	Networking Devices	Data Show Projector and Whiteboard	Report
Seventh	2				Midterm Exam
Eighth	2	Types and classes (Classful)	IP addresses	Data Show Projector and Whiteboard	Homework
Ninth	2	Special addresses types and specifications and private addresses	Special Addresses, Private Addresses	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Importance of Subnetting and how it works	Subnetting-1-	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Subnetting Examples	Subnetting Examples	Data Show Projector and Whiteboard	Homework
Twelfth	2	Supernetting	Supernetting	Data Show Projector and Whiteboard	Homework
Thirteenth	2	Classless IP Addresses	Classless IP Addresses	Review	Review
Fourteenth	2	Classless Examples	Classless Examples	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Revision	Revision	Data Show Projector and Whiteboard	Project Discussion

11. Infrastructure	
A- Required textbooks	TCP/IP Protocol Suite / Behrouze Forzan
B- Main References (Sources)	Data communication and Networking / Behrouze Forozan
C- Recommended books and references (scientific journals, reports, etc.)	

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.



Curriculum Description Form

Curriculum Description

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1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Computer Security - CMCS23 F41021**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 Theoretical + 2 Practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. Introducing the student to the fundamental concepts of computer security.
2. Familiarizing the student with security services, methods, and techniques.
3. Introducing the student to types of attacks, their methods, and protection strategies.
4. Introducing the student to basic encryption and decryption processes.
5. Teaching the student standard encryption architectures and their applications.
6. Educating the student on malware terminology, types, techniques, and related concepts.
7. Teaching the student the fundamentals of privacy.

9. Course outcomes, teaching, learning and assessment methods

A- The student will be able to:

2. Understand and comprehend the fundamental concepts of computer security.
3. Identify different security services and their implementation methods.
4. Recognize types of cyber attacks, their techniques, and protection strategies.
5. Apply basic encryption and decryption techniques.
6. Understand and utilize standard encryption architectures in various applications.
7. Analyze types of malware, their mechanisms, and countermeasures.
8. Understand the principles of privacy and its importance in cybersecurity.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Projector

Evaluation methods

- ✓ 1- Midterm Exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- Projects

C- Emotional and value goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- Laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- ✓ 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluating of assignments and discussions
- ✓ 5- Evaluation of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	What is computer security.	What is computer security.	Whiteboard	-
Second	2	Introduction to security goals, threats (attacks) and mechanisms.	Introduction	Data Show Projector	Homework
Third	2	objectives of computer security: Confidentiality Privacy: integrity , Availability.	Computer Security Objective	Data Show Projector and Whiteboard	Quiz
Fourth	2	Classical encryption technique, Symmetric cryptography .	Introduction to cryptography (basic concepts and terms).	Data Show Projector	Homework
Fifth	2	Describe the style of block ciphers	Fundamental of Block, Data encryption.	Data Show Projector	-
Sixth	2	Identification and Authentication User-names and Passwords	Identification and Authentication	Data Show Projector and Whiteboard	Report
Seventh	2	Password guessing	Identification and Authentication		Midterm Exam
Eighth	2	Number of Passwords	Identification and Authentication	Data Show Projector and Whiteboard	Homework
Ninth	2	Password spoofing,	Identification and Authentication	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	User and system defenses	Identification and Authentication	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Threats Internal Threats	Threats	Data Show Projector and Whiteboard	Homework
Twelfth	2	Threats External Threats	Threats	Data Show Projector and Whiteboard	Homework
Thirteenth	2			Review	Review
Fourteenth	2	Symptoms of a Malware Infection Types of Malicious Code	Malicious Software (code)	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Computer Viruses , Worms , Trojan Horse, trapdoor	Malicious Software (code)	Data Show Projector and Whiteboard	Project Discussion

11- Infrastructure	
A- Main References (Sources)	William Stallings," Cryptography and Network Security Principles and Practice ", Prentice Hall, Fifth Edition 2011.
B- Recommended books and references (scientific journals, reports, etc.)	• William Stallings," Cryptography and Network Security Principles and Practice ", Prentice Hall, Fifth Edition 2011. • Wu, Chwan-Hwa (John); Irwin, J. David (2013). Introduction to Computer Networks and Cybersecurity. Boca Raton: CRC Press. • "Definition of computer security". Encyclopedia. Ziff Davis, PCMag. Retrieved 6 September 2015.
C- B)Electronic references, websites, ...	

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Simulation and Computer Modeling - CMCS23 F41051**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 Theoretical (2 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to :

1. Understanding the basic concept of simulation.
2. Performing hand simulation for some examples.
3. Understanding the properties and methods of generating random numbers.
4. Generating random variables and their production methods.
5. Applying methods for generating observations from a random variable.
6. Input modeling in simulation.

9. Course outcomes, teaching, learning and assessment methods

A- The student will be able to:

2. Understand the fundamental concept of simulation.
3. Perform manual simulations for different examples.
4. Identify the properties and methods of generating random numbers.
5. Generate random variables using appropriate techniques.
6. Apply methods for generating observations from random variables.
7. Develop input modeling for simulation applications.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm Exam 2- Daily exams
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- projects

C- Emotional and value goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- 2- Laboratories
- ✓ 3- Fact-findings and investigation
- 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- ✓ 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- ✓ 5- Evaluation of individual and group research

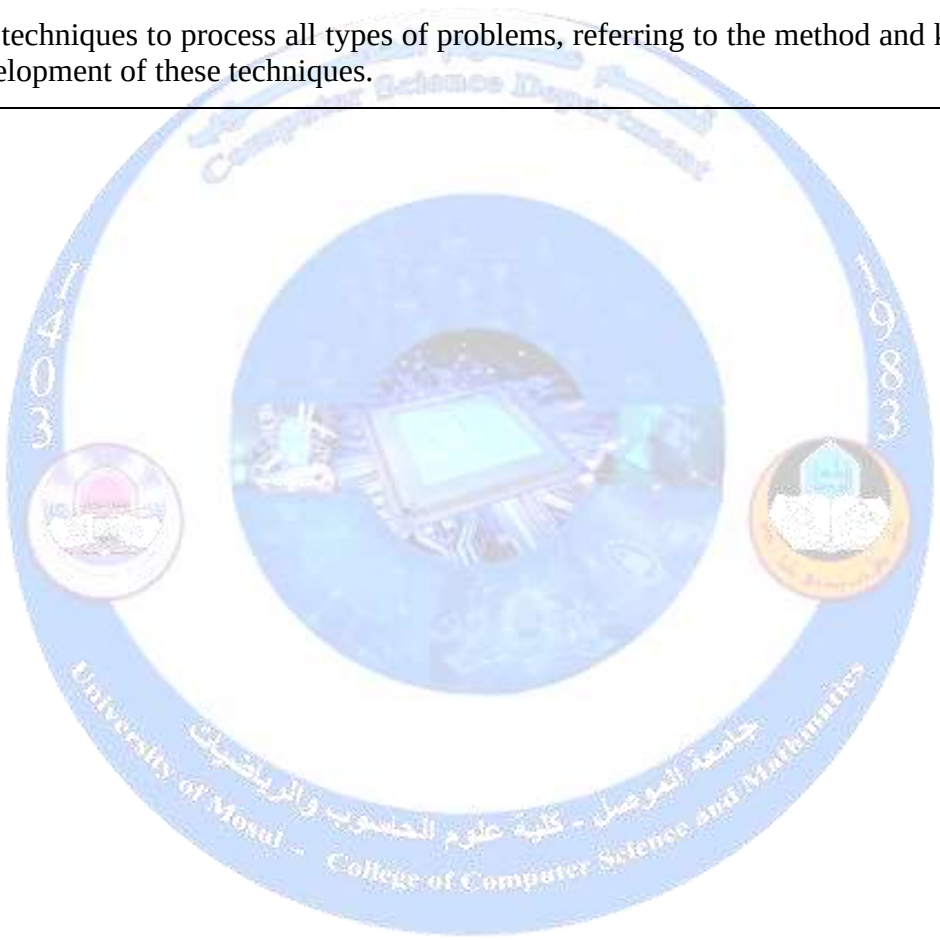
D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Introduction and Basic Definitions	Introduction	Whiteboard	-
Second	2	Models type and Simulation	Models type	Data Show Projector	Homework
Third	2	Hand Simulation Examples Single Channel Queue	Hand Simulation	Data Show Projector and Whiteboard	Quiz
Fourth	2	Practical examples of simulations	examples	Data Show Projector	Homework
Fifth	2	Methods of generating random numbers	Methods	Data Show Projector	-
Sixth	2	Properties of random numbers	random numbers	Data Show Projector and Whiteboard	Report
Seventh	2	Linear Congruential Method	Congruential Method		Midterm Exam
Eighth	2	Chi-square Test	Chi-square Test	Data Show Projector and Whiteboard	Homework
Ninth	2	Generate Random variables Inverse transform technique	Random variables	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Generate views from random variable	Random variables	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Input Modeling	Input Modeling	Data Show Projector and Whiteboard	Homework
Twelfth	2	Identify and choose the distribution of views	distribution of views	Data Show Projector and Whiteboard	Homework
Thirteenth	2			Review	Review
Fourteenth	2	Binomial Distribution	Distribution	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Poisson distribution and Normal distribution	Distribution	Data Show Projector and Whiteboard	Project Discussion

11- Infrastructure	
A- Main References (Sources)	مدخل الى المحاكاة التصادفية الحاسوبية ونمذجتها ياستخدام ماتلاب" المؤلف: أستاذ دكتور باسل يونس ذنون,
B- Recommended books and references (scientific journals, reports, etc.)	Modeling and simulation using Excel, SIMAN, Arena and General Purpose Simulation System (GPSS WORLD) By Dr. Majedabdrhmanbary
C- Electronic references, websites, ...	

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.



Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Image Processing -CMCS24 F41041**
4.Available attendance forms	**Presence**
5.Course/Year	**Courses system**
6.Number of study hours (total)	2 **Theoretical** + 2 **Practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. To provide a solid foundation in the basic concepts and principles of digital image processing. This includes understanding image formation, representation, color models, pixel visualization, and mathematical operations.
2. To implement the basic methods in digital image processing.
3. To teach students how to filter an image using different techniques. This includes spatial and frequency domain methods, histogram equalization, contrast stretching, and spatial filtering.
4. To teach students how to restore degraded images affected by noise, blurring, or other distortions.
5. To provide students with knowledge and skills to analyze and interpret images in terms of content and visible quality.
6. To provide hands-on experience in implementing image processing algorithms and conducting experiments by including practical sessions using MATLAB.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to

1. Recognize the necessary fundamentals for image processing.
2. Know the required mathematical operations.
3. Familiarize the students with the available color spaces.
4. Recognize the difference between scripts, functions, and p-codes.
5. Provide a hands-on solution for discrete Fourier transform questions.
6. Explain the filtration process in image processing.

7. Perform logical and neighborhood-based filtration processes.
8. Explain the convolution-based filters.
9. Describe the most famous image processing enhancement and restoration methods.
10. Describe the important image attributes.
11. Explain how to measure the quality of digital images using different methods.
12. Perform some important image morphological operations.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm Exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 4- Projects

C- Emotional and value goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- Laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluating assignments and discussions
- ✓ 5- Evaluation of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	DIP Fundamentals – Part 1	DIP Fundamentals – Part 1	Whiteboard	-
Second	2	DIP Fundamentals – Part 2	DIP Fundamentals – Part 2	Data Show Projector	Homework
Third	2	DIP Fundamentals – Part 3	DIP Fundamentals – Part 3	Data Show Projector and Whiteboard	Quiz
Fourth	2	Scripts, Functions & P-Codes	Scripts, Functions & P-Codes	Data Show Projector	Homework
Fifth	2	Color Spaces	Color Spaces	Data Show Projector	-
Sixth	2	Discrete Fourier Transform	Discrete Fourier Transform	Data Show Projector and Whiteboard	Report
Seventh	2	Image Filtering (Thresholding, Mean and Median)	Image Filtering (Thresholding, Mean and Median)		Midterm Exam
Eighth	2	*Scheduled Test*	*Scheduled Test*	Data Show Projector and Whiteboard	Homework
Ninth	2	Edge Detection / Image Sharpening	Edge Detection / Image Sharpening	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Contrast Enhancement	Contrast Enhancement	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Image Deblurring	Image Deblurring	Data Show Projector and Whiteboard	Homework
Twelfth	2	Image Quality Assessment – Part 1	Image Quality Assessment – Part 1	Data Show Projector and Whiteboard	Homework
Thirteenth	2			Review	Review
Fourteenth	2	Image Quality Assessment – Part 2	Image Quality Assessment – Part 2	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	*Revision*	*Revision*	Data Show Projector and Whiteboard	Project Discussion

11- Infrastructure	
A- Main References (Sources)	Gonzalez, R. C., Woods, R. E., & Eddins, S. L. (2020). Digital image processing using MATLAB. 3rd Edition. Knoxville: Gatesmark Publishing
B- Recommended books and references (scientific journals, reports, etc.)	• Burger, W., & Burge, M. J. (2022). Digital Image Processing: An Algorithmic Introduction. Springer Nature. • Thiruvikraman, P. K. (2019). A Course on Digital Image Processing with MATLAB®. IOP Publishing.
C- Electronic references, websites, ...	https://www.imageprocessingplace.com/

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**English Language (4) -CMCS23 F41071**
4.Available attendance forms	**Presence**
5.Course/Year	**Courses system**
6.Number of study hours (total)	2 **Theoretical (**2 **units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to:

1. To be able to speak English fluently and accurately.
2. To think in English and then speak.
3. To be able to talk in English.
4. To be able to compose freely and independently in speech and writing.
5. To be able to read books with understanding.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to

1. To address grammar issues that students encounter in their daily speech, writing, reading and listening
2. To address the issue of grammatical errors that affect effective communication
3. To improve your reading skills through the practice of vocabulary enrichment, reading comprehension exercises, written responses, discussions, and reflections
4. Recognize the structure and organization of paragraphs,
5. Use strategies to think critically about reading and use appropriate technology to enhance reading comprehension, and vocabulary development.
6. Develop the writing skill.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm Exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 4- Projects

C- Emotional and value goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- 2- Laboratories
- ✓ 3- Fact-findings and investigation
- 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluating assignments and discussions
- 5- Evaluation of individual and group research

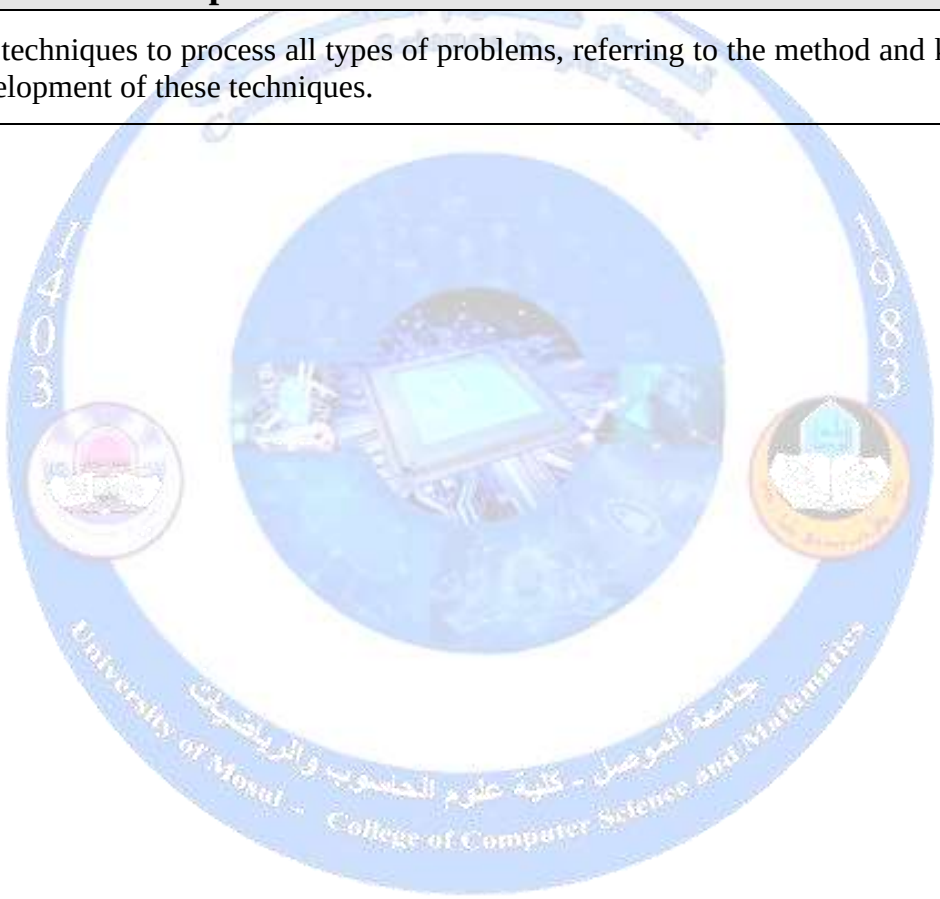
D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Review about Study materials	Introduction	Whiteboard	-
Second	2	wh- questions and answers.	Quantities	Data Show Projector	Homework
Third	2	reeding (about shopping).	Articles	Data Show Projector and Whiteboard	Quiz
Fourth	2	Shopping, prices.	Vocabulary	Data Show Projector	Homework
Fifth	2	Verb patterns, making questions.	Grammar	Data Show Projector	-
Sixth	2	Going to/will, practices, reading (Hollywood kids).	Future	Data Show Projector and Whiteboard	Report
Seventh	2	**Mid-term Exam**	**Mid-term Exam**		Midterm Exam
Eighth	2	Going to/will, practices, reading (Hollywood kids).	Future	Data Show Projector and Whiteboard	Homework
Ninth	2	hot verbs, listening, everyday English: how do you feel?.	Grammar	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	What ….. like? , Comparative and superlative adjectives big, bigger, practices.	Grammar	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Synonyms and antonyms.	Vocabulary	Data Show Projector and Whiteboard	Homework
Twelfth	2	everyday English about directions, listening and reading, practices.	everyday English about directions, listening and reading, practices.	Data Show Projector and Whiteboard	Homework
Thirteenth	2	Present tense, simple present, present continuous, practices.	Present tense, simple present, present continuous, practices.	Review	Review
Fourteenth	2	for/ since, practices, questions.	Grammar	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Adverbs, word pairs, practices.	Adverbs, word pairs, practices.	Data Show Projector and Whiteboard	Project Discussion

11- Infrastructure	
A- Main References (Sources)	Headway pre-intermediate plus student's book (john and Lize Soars)
B- Recommended books and references (scientific journals, reports, etc.)	Headway pre-intermediate plus work's book
C- Electronic references, websites, ...	https://7esl.com/

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.



Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Networking Lab- CMCS24 F42011**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**1 Theoretical + 2 Practical (2 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to :

1. introduce students to the concept of computer networks
2. Teaching the students the communication concepts, connection techniques and the infrastructure of internet.
3. Provide the students with the necessary information about the types of computer networks and the protocols that used in each one
4. Involve students with the main concepts and configurations of interconnecting devices, such as route, switch, etc.
5. Teaching the students the techniques that used to diagnosing and troubleshooting of networks.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to:

1. Understanding computer networks, types, models.
2. Understanding how internet and computer networks are works.
3. Understanding the protocols that used in TCP/IP Model in general.
4. Understanding the protocols of the network layer
5. Understanding the protocols of the Data link layer.
6. Understanding the interconnecting devices

B - Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm Exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 5- projects

C- Emotional and value goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ **1**- Theoretical lectures
- ✓ 2- Laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluating assignments and discussions
- ✓ 5- Evaluating individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure

Weeks	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment Method
First	2	Computer Networks Definition, types, Models	Introduction	Whiteboard	-
Second	2	Guided media: UTP, STP, Coaxial	Transmission Media-1-	Data Show Projector	Homework
Third	2	Unguided media: wireless, IR, Satellite, Bluetooth	Transmission Media-2-	Data Show Projector and Whiteboard	Quiz
Fourth	2	Network Criteria	Network Criteria	Data Show Projector	Homework
Fifth	2	ARP protocol	ARP -1-	Data Show Projector	-
Sixth	2	ARP Protocol four cases	ARP -2-	Data Show Projector and Whiteboard	Report
Seventh	2	DHCP	DHCP		Midterm Exam
Eighth	2	ICMP protocol -1-	ICMP protocol -1-	Data Show Projector and Whiteboard	Homework
Ninth	2	ICMP protocol -2-	ICMP protocol -2-	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	IP routing and delivery -1-	IP routing and delivery -1-	Data Show Projector and Whiteboard	Quiz
Eleventh	2	IP routing and delivery -2-	IP routing and delivery -2-	Data Show Projector and Whiteboard	Homework
Twelfth	2	IP routing and delivery -3-	IP routing and delivery -3-	Data Show Projector and Whiteboard	Homework
Thirteenth	2			Review	Review
Fourteenth	2	DNS Protocol	DNS protocol	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Revision	Revision	Data Show Projector and Whiteboard	Project Discussion

11- Infrastructure

A- Main References (Sources)	TCP/IP Protocol Suite / Behrouze Forzan
B- Recommended books and references (scientific journals, reports, etc.)	CCNA cisco Courses
C- Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Distributed System- CMCS24 F42041**
4.Available attendance forms	**Presence**
5.Course/Year	**Courses system**
6.Number of study hours (total)	**3 Theoretical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to :

1. Understanding Distributed Computing: The primary aim of a distributed systems course is to provide students with a comprehensive understanding of the fundamental concepts, principles, and techniques involved in distributed computing. This includes studying distributed algorithms, communication protocols, resource management, and synchronization mechanisms.
2. Designing Distributed Systems: The course aims to equip students with the knowledge and skills necessary to design and develop distributed systems.
3. Distributed Systems Models and Paradigms: The course aims to familiarize students with various models and paradigms used in distributed systems. This includes client-server architectures, peer-to-peer networks, distributed databases, cloud computing, and grid computing.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to:

1. Understanding of Distributed Systems Concepts: Students will gain a solid understanding of the fundamental concepts, principles, and models used in distributed systems.
2. Knowledge of Distributed Algorithms and Techniques: Students will learn about various algorithms and techniques used in distributed systems.
3. Awareness of the virtualization technologies and Code migration techniques.
4. Understanding of Networking and Communication: Students will gain knowledge of networking principles and communication protocols used in distributed systems. This includes understanding network topologies, message passing, remote procedure calls (RPC), and data serialization techniques.
5. Recognizing the concepts of Distributed File Systems and how to deal with the files on modern systems.
6. Understanding the importance of the Synchronization for the distributed systems and how different algorithms are designed and used.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm Exam
- ✓ 2- Quizzes
- ✓ 3- reports
- ✓ 4- Assignments
- 4- Projects

C- Emotional and value goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods
✓ 1- Theoretical lectures 2- laboratories ✓ 3- Fact-findings and investigation 4- Discussion groups within practical lessons
Evaluation methods
✓ 1- Written exams 2- Research projects 3- Summer discussions ✓ 4- Evaluation of assignments and discussions 5- Evaluation of individual and group research
D- General and transferable skills (other skills related to employability and personal development). 1. Developing the ability to work effectively in a team. 2. Developing the ability for self-directed learning. 3. Developing the ability to generate and discuss ideas. 4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure

Weeks	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment Method
First	2	Definition, characteristics and goals of a distributed system.	Introduction	Whiteboard	-
Second	2	Types of distributed system , clusters and grid computing system, distributed information system.	Common types of Distributed Systems	Data Show Projector	Homework
Third	2	Architecture style, system architecture, centralized and decentralized architecture.	Architecture Style	Data Show Projector and Whiteboard	Quiz
Fourth	2	Processes, threads implementation, multithreaded server, clients, servers, distributed servers.	Threads and Multithreaded Clients and Servers	Data Show Projector	Homework
Fifth	2	Virtualization, architecture of virtual machines.	Virtualization	Data Show Projector	-

Sixth	2	Code migration.	Code Migration	Data Show Projector and Whiteboard	Report
Seventh	2	Communications, layered protocols, types of communications.	Layard Protocols		Midterm Exam
Eighth	2	Remote procedure calls, clients and server stubs, asynchronous RPC.	Remote Procedure Calls	Data Show Projector and Whiteboard	Homework
Ninth	2	Message oriented communications, message queuing model, channels.	Message oriented communications	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Stream oriented communications, quality of service, multicast communications.	Stream oriented communications	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Naming, names, identifiers, structured naming.	Naming	Data Show Projector and Whiteboard	Homework
Twelfth	2	The Implementation of a Name Space, The DNS Name Space.	DNS Name Space	Data Show Projector and Whiteboard	Homework
Thirteenth	2			Review	Review
Fourteenth	2	Synchronization, Global Positioning System.	Synchronization	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Clock Synchronization	Synchronization Algorithms	Data Show	Project Discussion

		Algorithms, Network Time Protocol.		Projector and Whiteboard	

11- Infrastructure	
A- Main References (Sources)	Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems: Principals and Paradigms, 2nd ed., Upper Saddle River, New Jersey, USA: Prentice Hall, 2007.
B- Recommended books and references (scientific journals, reports, etc.)	Marten Van Steen and Andrew S. Tanenbaum, Distributed System, 3rd Edition 2017.
C- Electronic references, websites, ...	https://www.coursera.org/courses?query=distributed%20system

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

Curriculum Description Form

Curriculum Description

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1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Security Multimedia - CMCS24 F42021**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 Theoretical + 2 Practical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to :

1. Enable students to understand that digital multimedia (audio, video, still photography, etc.) is exposed to a wide range of security issues.
2. Highlight the importance of protecting digital media from unauthorized distribution or modification from the media provider's perspective.
3. Emphasize the need for recipients to ensure that downloaded multimedia is virus-free and legitimately obtained.
4. Introduce encryption and digital branding tools as effective methods for securing multimedia content.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to:

1. Identify security threats associated with digital multimedia, including audio, video, and still photography.
2. Explain the importance of protecting digital media from unauthorized distribution or modification.
3. Assess methods for verifying the integrity of digital media to ensure it is virus-free and legitimately obtained.
4. Apply encryption techniques and digital branding tools to secure multimedia content.
5. Understand the role of firewalls in network security, firewall characteristics, and intrusion detection principles.
6. Describe categories of malware and the nature of distributed denial of service attacks.
7. Understand cloud computing concepts, services, deployment models, security issues, and Cloud Security as a Service.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- ✓ B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm Exam
- ✓ 2- Quizzes
- ✓ 3- Reports
- ✓ 4- Assignments
- 4- Projects

C- Emotional and value goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Research and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- ✓ 2- Practical laboratories
- ✓ 3- Fact-findings and investigation
- ✓ 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluating assignments and discussions
- ✓ 5- Evaluating individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure					
Weeks	**Hours**	**Required learning outcomes**	**Unit name/topic**	**Teaching method**	**Assessment Method**
First	2	Introduction to Multimedia Security	Introduction	Whiteboard	-
Second	2	Digital WaterMarking methods	Digital WaterMarking	Data Show Projector	Homework
Third	2	Digital WaterMarking methods	Digital WaterMarking (cont.)	Data Show Projector and Whiteboard	Quiz
Fourth	2	Digital Rights Management in details	Digital Rights Management	Data Show Projector	Homework
Fifth	2	Digital Watermarking Technologies in details with examples	Digital Watermarking Technologies	Data Show Projector	-
Sixth	2	Digital Watermarking Technologies in details with examples	Digital Watermarking Technologies (cont.)	Data Show Projector and Whiteboard	Report
Seventh	2	Types of Digital Watermarks in details with examples	Types of Digital Watermarks		Midterm Exam
Eighth	2	Introduction, application with examples	Image Watermarking	Data Show Projector and Whiteboard	Homework
Ninth	2	Introduction, application with examples	Image Watermarking (cont.)	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Introduction, protocols, layers	Communication-based	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Introduction, applications with examples	Models of Watermarking-Geometric models	Data Show Projector and Whiteboard	Homework
Twelfth	2	Audio Watermarking in details with examples and applications	Audio Watermarking	Data Show Projector and Whiteboard	Homework
Thirteenth	2	Review	Review	Data Show Projector and Whiteboard	Homework
Fourteenth	2	Video Watermarking in details with examples and applications	Video Watermarking	Data Show Projector	Quiz

				and Whiteboard	
Fifteenth	2	Revision	Revision	Data Show Projector and Whiteboard	Project Discussion

11- Infrastructure	
A- Main References (Sources)	Stallings, William. "Cryptography and network security principles and practices." (2020).
B- Recommended books and references (scientific journals, reports, etc.)	Stallings, William. Computer security principles and practice. 2020.
C- Electronic references, websites, ...	https://www.coursera.org/learn/network-security

12. Curriculum Development Plan
Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

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1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**

2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Electronic Commerce- CMCS24 F42031**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**3 Theoretical (3 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to :

1. Understand the fundamentals of e-commerce.
2. Learn the e-commerce technologies.
3. Understand the applications of e-commerce in various domains.
4. Recognize the role of information technology in e-commerce.
5. Understand security and privacy issues in e-commerce.
6. Learn the e-marketing strategies.
7. Understand electronic payment systems.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to:

1. Understanding the fundamentals of e-commerce.
2. Identify and apply various e-commerce technologies.
3. Analyze the applications of e-commerce across different domains.
4. Recognize the importance of information technology in enabling e-commerce.
5. Understand and address security and privacy concerns in e-commerce.
6. Develop and implement effective e-marketing strategies.
7. Understand and evaluate electronic payment systems in e-commerce transactions.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm Exam
- ✓ 2- Quizzes
- ✓ 3- Reports

✓ 4- Assignments 5- Research projects
C- Emotional and value goals ✓ 1- Deduction and analysis skills ✓ 2- Comparison skills ✓ 3- Discussion skills ✓ 4- Using the computer and the Internet ✓ 5- Fact-findings and investigation 6- Conducting research and drawing conclusions 7- Decision making
Teaching and learning methods
✓ 1- Theoretical lectures 2- Laboratories ✓ 3- Fact-findings and investigation 4- Discussion groups within practical lessons
Evaluation methods
✓ 1- Written exams ✓ 2- Research projects 3- Summer discussions ✓ 4- Evaluating assignments and discussions 5- Evaluating individual and group research
D- General and transferable skills (other skills related to employability and personal development). 1. Developing the ability to work effectively in a team. 2. Developing the ability for self-directed learning. 3. Developing the ability to generate and discuss ideas. 4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure

Weeks	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment Method
First	2	Definition of E-commerce; Electronic commerce and physical commerce; The Development and Growth of Electronic Commerce	Introduction	Whiteboard	-
Second	2	E-commerce Scenarios; Advantages and Disadvantages Of E-commerce; Threats of E-commerce, Components of E-	E-Commerce Categories and features	Data Show Projector	Homework

		CommerceE-Commerce: Goods and Services.			
Third	2	Types of e-commerce: B2C, B2B, C2B, C2C, B2G, G2B , G2C.	E-Business & E-Commerce and E-govenment	Data Show Projector and Whiteboard	Quiz
Fourth	2	Benefits to Organizations; Benefits to Consumers; Benefits to Society; The Limitations of e-commerce	Mobile E-commerce and The Benefits of e-commerce	Data Show Projector	Homework
Fifth	2	Internet; Intranet; Extranet: definition and advantages; Wireless Application Protocol	Types of Networking For E-Commerce	Data Show Projector	-
Sixth	2	Types of Electronic Payment Systems: Types, definition and advantages	E-Payment Systems	Data Show Projector and Whiteboard	Report
Seventh	2		Mid semester exam		Midterm Exam
Eighth	2	Definition; advantages and disadvantages	Electronic Checks and Electronic Purses	Data Show Projector and Whiteboard	Homework
Ninth	2	Security Requirements For E-Commerce; Risks in Electronic Payment systems	Security Requirements In Electronic Payment Systems	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Definition; advantages and disadvantages Types of E-Marketing	E-Marketing	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Definition; advantages and disadvantages Types of Advertising	Advertising	Data Show Projector and Whiteboard	Homework
Twelfth	2	Definition; Types of E-Auction; Benefits of E-Auctions; Limitations of E-Auction	Online Auction	Data Show Projector and Whiteboard	Homework
Thirteenth	2			Review	Review
Fourteenth	2	EDI & Electronic Commerce; EDI layered architecture; Applications of EDI; definition and Types of Firewall; Secure Socket Layer SSL Technique	Electronic Data Interchange and Firewall	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Revision	Revision	Data Show Projector	Project Discussion

				and Whiteboard	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.

11- Infrastructure

A. Main References (Sources)	E-Commerce Fundamentals and Applications by henry Chan and Raymond lee, 2002.
B. Recommended books and references (scientific journals, reports, etc.)	Introduction to Electronic Commerce and Social Commerce, Efraim Turban, Judy Whiteside, David King and Jon Outland - Springer (2017)
C. Electronic references, websites, ...	

Curriculum Description Form

Curriculum Description

This curriculum description provides a concise summary of the key features of the curriculum and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. It is Core to link it to the program description.

1.Educational institution	**College of Computer Science and Mathematics/University of Mosul**
2.Scientific Department / Center	**Faculty of Computer Science Mathematics / Computer Science Department**
3.Course Name/Code	**Information Theory - CMCS24 F42051**
4.Available attendance forms	**Presence**
5.Course/Year	**Course system**
6.Number of study hours (total)	**2 Theoretical + 1 Tutorial (2 units)**
7.Date this description was prepared	**1/9/2023**

8.Course objectives

The course aims to :

1. Understand the basic concepts of information theory.
2. Gain a brief understanding of the history of information theory.
3. Explore the applications of information theory in various fields.
4. Learn the fundamentals of probability, such as marginal probability, joint probability, and conditional probability.
5. Understand the concepts of information and entropy.
6. Learn about data compression and data coding techniques.
7. Understand the types of channels and the properties of symmetric channels, with examples for each type.

9. Course outcomes, teaching, learning and assessment methods

A- Students will be able to:

1. Understanding the basic concepts of information theory.
2. Recognize the historical development and significance of information theory.
3. Apply the concepts of information theory to various real-world applications.
4. Calculate and apply marginal, joint, and conditional probabilities.
5. Understand and calculate information and entropy in different contexts.
6. Apply data compression and coding techniques.
7. Identify and analyze different types of channels and understand the properties of symmetric channels with practical examples.

B - Course specific skill objectives

- ✓ B1 - Theoretical
- B2 - Practical
- B3 - Summer training
- B4 - Graduation research

Teaching and learning methods

- ✓ 1- Whiteboard
- ✓ 2- Smart board
- ✓ 3- Data Show Projector

Evaluation methods

- ✓ 1- Midterm Exam
- ✓ 2- Quizzes
- ✓ 3- reports
- ✓ 4- Assignments
- 5- projects

C- Emotional and value goals

- ✓ 1- Deduction and analysis skills
- ✓ 2- Comparison skills
- ✓ 3- Discussion skills
- ✓ 4- Using the computer and the Internet
- ✓ 5- Fact-findings and investigation
- 6- Conducting research and drawing conclusions
- 7- Decision making

Teaching and learning methods

- ✓ 1- Theoretical lectures
- 2- laboratories
- ✓ 3- Fact-findings and investigation
- 4- Discussion groups within practical lessons

Evaluation methods

- ✓ 1- Written exams
- 2- Research projects
- 3- Summer discussions
- ✓ 4- Evaluation of assignments and discussions
- 5- Evaluation of individual and group research

D- General and transferable skills (other skills related to employability and personal development).

1. Developing the ability to work effectively in a team.
2. Developing the ability for self-directed learning.
3. Developing the ability to generate and discuss ideas.
4. Developing the ability to solve problems in a logical and structured manner.

10. Curriculum structure

Weeks	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment Method
First	2	Introduction and Preview.	Introduction	Whiteboard	-
Second	2	Entropy, Information defines,	Entropy_ introduction	Data Show Projector	Homework
Third	2	The Measure of Information	Information	Data Show Projector and Whiteboard	Quiz
Fourth	2	Examples	Information	Data Show Projector	Homework
Fifth	2	Data Compression introduction.	Data Compression	Data Show Projector	-
Sixth	2	Huffman codes.	Source coding	Data Show Projector and Whiteboard	Report
Seventh	2	Shannon-Fano-Elias coding.	Source coding		Midterm Exam
Eighth	2	Arithmetic coding.	Source coding	Data Show Projector and Whiteboard	Homework
Ninth	2	Source coding	Source coding	Data Show Projector and Whiteboard	Prepare a report
Tenth	2	Preview of the channel coding theorem.	channel coding	Data Show Projector and Whiteboard	Quiz
Eleventh	2	Preview of the channel coding theorem.	channel coding	Data Show Projector and Whiteboard	Homework
Twelfth	2	Hamming codes.	channel coding	Data Show Projector and Whiteboard	Homework
Thirteenth	2	Review	Review	Data Show Projector and Whiteboard	Homework
Fourteenth	2	Hamming codes.	channel coding	Data Show Projector and Whiteboard	Quiz
Fifteenth	2	Revision	Revision	Data Show Projector and Whiteboard	Project Discussion

11- Infrastructure

A. Main References (Sources)	Thomas M. Cover and Joy A. Thomas, Elements of Information Theory , wileym 2006
B. Recommended books and references (scientific journals, reports, etc.)	David Salomon, Giovanni Motta and David Bryant, Handbook of Data Compression,Fifth Edition, Springer, 2010, www.it-ebooks.info
C. Electronic references, websites, ...	

12. Curriculum Development Plan

Adding new techniques to process all types of problems, referring to the method and keeping pace with the development of these techniques.