Republic of Iraq - Ministry of Higher Education and Scientific Research

University of Basrah

Bachelor's degree in Computer Engineering (First cycle)

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

Program Curriculum (2023 - 2024)

جمهورية العراق - وزارة التعليم العالي والبحث العلمي

جامعة البصرة

بكالوريوس في هندسة الحاسبات (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 hr/sem	USSWL hr/sem	SWL hr/sem	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)							
UGI	One	1	CoE111	Calculus I	الرياضيات ا	English	3				1		2	62	113	175	7.00	B	
		2	CoE112	Electrical Circuits 1	الدوائر الكهربائية 1	English	3		2		1		3	93	57	150	6.00	S	
		3	CoE113	Programming & Problems Solving	البرمجة و حلول المشاكل	English	3		2		1		3	93	57	150	6.00	C	
		4	CoE114	Fundamentals of Logic systems	مبادىء الانظمة المنطقية	English	3						2	47	78	125	5.00	C	
		5	CoE115	Industrial Chemistry	الكيمياء الصناعية	English	2						2	32	43	75	3.00	B	
		6	CoE116	English Language I	اللغة الانكليزية ا	English	2						2	32	43	75	3.00	S	
						Total	16	0	4	0	3	0	14	359	391	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	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)							
UGI	Two	1	CoE121	Calculus II	الرياضيات II	English	3				1		2	62	113	175	7.00	B	CoE111
		2	CoE122	Digital Logic Circuits	دوائر المنطق الرقمي	English	2	1	2				3	78	72	150	6.00	C	CoE114
		3	CoE123	Object Oriented Programming	البرمجة الكيانية	English	3		2		1		3	93	82	175	7.00	C	CoE113
		4	CoE124	Engineering Design/ Auto CAD	التصميم الهندسي/ الرسم بالحاسب	English	1		2				2	47	53	100	4.00	S	
		5	CoE125	Device Physics	فيزياء الأجهزة	English	2						2	32	43	75	3.00	B	
		6	CoE126	English language II/ Technical Writing	لغة انكليزية II	English	2						2	32	43	75	3.00	S	CoE116
						Total	13	1	6	0	2	0	14	344	406	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	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)							
UGII	Three	1	CoE211	Calculus III	الرياضيات III	English	3				1		2	62	88	150	6.00	B	CoE121
		2	CoE212	Discrete Structures	هياكل متقطعة	English	2				1		2	47	53	100	4.00	S	
		3	CoE213	Signals & Systems	اشارات و انظمة	English	3				1		2	62	63	125	5.00	C	CoE112
		4	CoE214	Digital System Design	تصميم النظم الرقمية	English	3		2		1		3	93	57	150	6.00	C	CoE122
		5	CoE215	Electrical Circuits 2	دوائر كهربائية 2	English	3		2		1		3	93	57	150	6.00	C	CoE112
		6	CoE216	Human Rights, Democracy & Freedom	حقوق الانسان و الديمقراطية و الحرية	Arabic	2						2	32	43	75	3.00	B	
						Total	16	0	4	0	5	0	14	389	361	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	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)							
UGII	Four	1	CoE221	Differential Equations	معادلات تفاضلية	English	3				1		2	62	63	125	5.00	S	CoE211
		2	CoE222	Probability and Statistics	الاحتمالية و الإحصاء	English	3				1		2	62	63	125	5.00	C	CoE121
		3	CoE223	Microprocessor Programming	برمجة مايكروبروسسر	English	3		2				3	78	72	150	6.00	C	CoE214
		4	CoE224	Algorithms	الخوارزميات	English	3		2				3	78	72	150	6.00	C	CoE123
		5	CoE225	Digital Electronics	الالكترونيات الرقمية	English	2				1		2	47	78	125	5.00	S	CoE115
		6	CoE226	Ethics, Society, Profession	اخلاقيات المهنة	English	2						2	32	43	75	3.00	S	
						Total	16	0	4	0	3	0	14	359	391	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)	Exam	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	hr/sem		Type	Code
		1	CoE311	Linear Algebra	الجبر الخطي	English	2				1		2	47	78	125	5.00	S	CoE221
		2	CoE312	Computer Architecture	معمارية الحاسبة	English	2		2		1		3	78	72	150	6.00	C	CoE223
		3	CoE313	Operating Systems	انظمة التشغيل	English	2		2		1		3	78	72	150	6.00	C	
	Five	4	CoE314	Artificial Intelligence	الذكاء الصناعي	English	2				1		2	47	78	125	5.00	C	CoE224
		5	CoE315	Analog Electronics	الاكترونيات التناظرية	English	2		2		1		3	78	47	125	5.00	S	CoE122
		6	CoE316	Engineering Economics	الاقتصاد الهندسي	English	2						2	32	43	75	3.00	S	
						Total	12	0	6	0	5	0	15	360	390	750	30.00		

UGIII	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			
		1	CoE321	Numerical Analysis	تحليلات عددية	English	2				1		2	47	78	125	5.00	S	CoE311
		2	CoE322	Microprocessor Interface	موائمة المعالجات الدقيقة	English	2		2		1		3	78	47	125	5.00	C	CoE223
		3	CoE323	Instrumentation	ادوات قياس	English	2						2	32	68	100	4.00	C	CoE215
	Six	4	CoE324	Digital Communication	اتصالات رقمية	English	2		2		1		3	78	72	150	6.00	C	
		5	CoE325	Computer Maintenance	صيانة الحاسبة	English	1		2				2	47	53	100	4.00	C	
		6	CoE326	Digital Signal Processing	معالجة الاشارة الرقمية	English	2		2		1		3	78	72	150	6.00	C	
						Total	11	0	8	0	4	0	15	360	390	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			
		1	CoE411	Embedded Computing Systems	الانضمة المضمنة	English	2		2		1		3	78	72	150	6.00	C	CoE322
		2	CoE412	Computer Network	شبكات الحاسبات	English	2		2		1		3	78	72	150	6.00	C	CoE324
		3	CoE413	Control Systems	انظمة السيطرة	English	2				1		3	48	77	125	5.00	C	
	Seven	4	CoE4P	Engineering Project (continued)	المشروع الهندسي	English	2		3				2	77	48	125	5.00	C	
		5	CoE414	Project management	ادارة المشاريع	English	2						2	32	43	75	3.00	S	
		6	CoE415	Image Processing	معالجة الصور	English	2		2				3	63	62	125	5.00	E	
						Total	12	0	9	0	3	0	16	376	374	750	30.00		

UGIV	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			
		1	CoE421	Information Security	امنية المعلومات	English	2						2	32	68	100	4.00	E	
		2	CoE422	Software Design	تصميم برمجيات	English	2		2				3	63	62	125	5.00	C	
		3	CoE423	Networks Technology	تقنيات الشبكات	English	2		2		1		3	78	47	125	5.00	C	CoE412
	Eight	4	CoE424	Parallel Processing Architecture	معمارية المعالجة المتوازية	English	3						2	47	78	125	5.00	C	CoE312
		5	CoE4P	Engineering Project	المشروع الهندسي	English	2		3				2	77	48	125	5.00	C	
		6	CoE425	Discrete Control Systems	السيطرة المتقطعة	English	2		2		1		3	78	72	150	6.00	C	CoE413
						Total	13	0	9	0	2	0	15	375	375	750	30.00		
						Total	109	1	50	0	27	0	117	2922	3078	6000	240.0		Must be 240 ECTS

Note: The student should complete 4 weeks of Summer Internships to fullfil the requirements of the Bachelor's degree

Structured SWL (hr/w) type		
	CL	Class Lecture
	Lab	Laboratory
	Pr	Practical Training
	Tut	Tutorial
	Lect	Online lecture
	Semn	Seminar

Module type		
	B	Basic learning activities
	C	Core learning activity
	S	Suport or related learning activity
	E	Elective learning activity

SWL:	Student Workload
SSWL:	Structured SWL
USSWL:	Unstructured SWL

Note: Columns O, Q and R are progrmaed, protected and should not be edited

University of Basrah
جامعة البصرة

First Cycle – Bachelor's Degree (B.Sc.) – Computer Engineering
بكالوريوس – هندسة الحاسبات

Table of Contents | جدول المحتويات

1. Mission & Vision Statement

Vision Statement

A scientific and practical pioneering environment in both research and teaching sectors and has the capability of keeping pace with the continues growth of the technological developments in the fields of computer engineering and information technology.

Mission Statement

The department seeks to provide the excellent environment that stimulates creativity, innovation, research and development in order to produce highly qualified computer engineers who are able to serve the labor market locally and globally.

2. Program Specification

Programme code:	**CoE**	**ECTS**	**240**
Duration:	**4 levels, 8 Semesters**	**Method of Attendance:**	**Full Time**

Computer engineering department has been established in 1997 to meet the emerging needs for skilled computer engineers also to keep track with the global scientific and technical progress. The Department thrives on exploration and discovery from the beginning, it adopted an efficient academic program that matched the global standers in both theocratical and practical fields.

Students who join our department are able to develop skills and knowledge that set them on successful and enriching careers especially our program focus on the practical sector to establish the required qualifications that are vital to securing employment in the wider industry. The undergraduate study at the department takes four years in total then the student will be awarded a Bachelor of Science degree in computer engineering.

As known Postgraduate studies can open the door to new experiences and opportunities, our department started the postgraduate courses in 2001 to grant Master's degree in computer engineering after completing two years of the academic study.

3. Program Goals

1. Provide highly qualified and competitive computer engineers who can deal with the professional challenges in both private and public sectors since that are well prepared and fully equipped for a successful career as computer engineers.
2. Providing advanced academic programs in the computer engineering field for both theoretical and practical sectors that match the international standards and meet the labor market needs.
3. Encourage the development of the scientific research in computer engineering field especially the information technology, computer software, computer networks, telecommunication systems, AI and robotics.
4. Communicate effectively in a variety of professional contexts with the private, public and government sectors.
5. Create enabling environment for the faculty member that helps them to improve their teaching and research skills.

4. Student Learning Outcomes

1. Knowledge and Understanding

1-1. Clarify the basic concepts of computer systems and their applications in social and industrial fields.

1-2. Acquiring skill in dealing with problems and dealing with them through computer systems.

1-3. Acquiring basic skills for the software industry.

1-4. Acquiring experience in industrial computer systems.

1-5. Designing programmed home systems.

1-6. Making websites and databases for various engineering systems.

1-7. Achieving the a to k criterion.

2. Subject-specific skills

2-1. The ability to design simple and advanced programs in different programming languages.

2-2. The ability to think in addressing the issues by algorithms and methods of work.

2-3. Writing scientific reports, reading charts and analyzing digital data.

3. Thinking Skills

3-1. Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

3-2. Response: Follow up the student's interaction with the material displayed on the screen

3-3. Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

3-4. Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

3-5. The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

4. General and Transferable Skills (other skills relevant to employability and personal development)

4-1. Developing the student's ability to deal with technology.

4-2. Develop the student's ability to deal with the Internet.

4-3. Develop the student's ability to deal with multiple media.

4-4. Developing the student's ability to dialogue and debate.

5. Academic Staff

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6. Credits, Grading and GPA

Credits

University of Basrah is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

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:				

Number 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.

Calculation of the Cumulative Grade Point Average (CGPA)

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

   CGPA of a 4-year B.Sc. degree:

   CGPA = [(1^{st} module score x ECTS) + (2^{nd} module score x ECTS) + ……] / 240

7. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CoE111	Calculus I	62	113	7.00	B	
CoE112	Electrical Circuits 1	93	57	6.00	S	
CoE113	Programming & Problems Solving	93	57	6.00	C	
CoE114	Fundamentals of Logic systems	47	78	5.00	C	
CoE115	Industrial Chemistry	32	43	3.00	B	
CoE116	English Language I	32	43	3.00	S	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CoE121	Calculus II	62	113	7.00	B	CoE111
CoE122	Digital Logic Circuits	78	72	6.00	C	CoE114
CoE123	Object Oriented Programming	93	82	7.00	C	CoE113
CoE124	Engineering Design/ Auto CAD	47	53	4.00	S	
CoE125	Device Physics	32	43	3.00	B	CoE115
CoE126	English language II/ Technical Writing	32	43	3.00	S	CoE116

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CoE211	Calculus III	62	88	6.00	B	CoE121
CoE212	Discrete Structures	47	53	4.00	S	
CoE213	Signals & Systems	62	63	5.00	C	CoE112
CoE214	Digital System Design	93	57	6.00	C	CoE122
CoE215	Electrical Circuits 2	93	57	6.00	C	CoE112
CoE216	Human Rights, Democracy & Freedom	32	43	3.00	B	

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CoE221	Differential Equations	62	63	5.00	S	CoE211
CoE222	Probability and Statistics	62	63	5.00	C	CoE121
CoE223	Microprocessor Programming	78	72	6.00	C	CoE214
CoE224	Algorithms	78	72	6.00	C	CoE123
CoE225	Digital Electronics	47	78	5.00	S	CoE115
CoE226	Ethics, Society, Profession	32	43	5.00	S	

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CoE311	Linear Algebra	47	78	5.00	S	CoE221
CoE312	Computer Architecture	78	72	6.00	C	CoE214
CoE313	Operating Systems	78	72	6.00	C	
CoE314	Artificial Intelligence	47	78	5.00	C	CoE224
CoE315	Analog Electronics	78	47	5.00	S	CoE122
CoE316	Engineering Economics	32	43	3.00	S	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CoE321	Numerical Analysis	47	78	5.00	S	CoE311
CoE322	Microprocessor Interface	78	47	5.00	C	CoE223
CoE323	Instrumentation	32	68	4.00	C	CoE215
CoE324	Digital Communication	78	72	6.00	C	
CoE325	Computer Maintenance	47	53	4.00	C	
CoE326	Digital Signal Processing	78	72	6.00	C	

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CoE411	Embedded Computing Systems	78	72	6.00	C	CoE322
CoE412	Computer Network	78	72	6.00	C	CoE324
CoE413	Control Systems	48	77	5.00	C	
CoE4P	Engineering Project (continued)	77	48	5.00	C	
CoE414	Project management	32	43	3.00	S	
CoE415	Image Processing	63	62	5.00	E	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
CoE421	Information Security	32	68	4.00	E	
CoE422	Software Design	63	62	5.00	C	
CoE423	Networks Technology	78	47	5.00	C	CoE412
CoE424	Parallel Processing Architecture	47	78	5.00	C	CoE312
CoE4P	Engineering Project	77	48	5.00	C	
CoE425	Discrete Control Systems	78	72	6.00	C	CoE413

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University of Basrah
جامعة البصرة

First Cycle – Bachelor's Degree (B.Sc.) – Computer Engineering

بكالوريوس – هندسة الحاسبات

Table of Contents

1. Overview

This catalogue is about the courses (modules) given by the program of Computer Engineering to gain the Bachelor of Science degree. The program delivers (48) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة الحاسبات للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (48) مادة دراسية مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
CoE111	Calculus I	7	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	62	113
Description			
Calculus gives engineers the ability to model and control systems. It provides a way to construct relatively simple quantitative and deduce their consequences and the ability to find the effects of changing conditions on the system being investigated. This semester reviews the basic ideas a student need to start calculus for engineering. Topics include a brief review of functions, followed by a discussion of limits, derivatives, and applications of differential calculus to real-world problem areas. An introduction to integration concludes the course, with a brief description of complex geometry.			

Module 2

Code	Course/Module Title	ECTS	Semester
CoE112	Electrical Circuits 1	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	93	57

Description
Understanding basic circuit components, such as resistors, capacitors, and inductors, and their properties. Familiarizing with various types of circuits, such as series, parallel, and combination circuits. Analyzing DC circuits using different analysis techniques. Analyzing AC circuits using complex impedance and phasor notation. Understanding the behavior of circuits with reactive components. Understanding the concept of power and energy in circuits, developing practical skills in designing and building basic electrical circuits.

Module 3

Code	Course/Module Title	ECTS	Semester
CoE113	Programming & Problems Solving	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	93	57
Description			
The Programming and Problem-Solving module focuses on developing skills in programming and problem-solving techniques. This module aims to provide students with a solid foundation in computer programming concepts and the ability to apply these concepts to solve real-world problems. Throughout the module, students will learn various programming languages, such as C++. They will gain a thorough understanding of fundamental programming concepts like variables, data types, control structures (loops and conditionals) and functions.			

Module 4

Code	Course/Module Title	ECTS	Semester
CoE114	Fundamentals of Logic systems	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3		47	78
Description			
This course aims to enable the student to learn basics of digital systems design, Numbering Systems and Conversion between different number systems, Mathematical Operations of different number systems, Principles and laws of Boolean algebra, Simplification logical functions using K-Map, Design the Logic circuits, Coding systems.			

Module 5

Code	Course/Module Title	ECTS	Semester
CoE115	Industrial Chemistry	3	1

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		32	43
Description			
Describe the fundamental issues of chemical reactions, equilibrium and kinetics. Study the considerations of industrial chemistry such as reaction evaluation and types of industrial reactors. Depict the chemistry of gas and petroleum. Elaborate on the chemistry of ethylene and propylene and treat the C4 and C5 olefins. Discuss the chemistry of the benzene, toluene, and the xylenes.			

Module 6

Code	Course/Module Title	ECTS	Semester
CoE116	English Language I	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	43
Description			
The main aim of this module is to enable the student to use the English language effectively for study purposes across the curriculum. Also, to develop and integrate the use of the four language skills: Reading, Listening, Speaking and Writing to revise and reinforce structure already learnt.			

Module 7

Code	Course/Module Title	ECTS	Semester
CoE121	Calculus II	7	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	62	113
Description			
Calculus II demands familiarity with mathematical concepts from Calculus I: integration, differentiation, limits, integrals, trigonometric properties, the fundamental theorem of calculus, and graphing techniques. The goal of the semester is to improve students' problem-solving abilities through examples and problems covered in lectures, problem sets, exams, and quizzes. The semester expounds and focuses on the topics: Coordinates, determinants, matrices, multiple Integrals, and functions of two or more variables. The students apply basic concepts and more difficult problems to develop students critical thinking skills.			

Module 8

Code	Course/Module Title	ECTS	Semester
CoE122	Digital Logic Circuits	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	3	78	72
Description			
Analyze and design the combinational logic circuits like (adder circuits, subtractor circuits, comparator circuits, multiplexer, and etc.). Analyze and implement the sequential logic circuits (Latches and Flip - Flops). Analyze and design a different types of register circuits (shift register). Analyze and design the counter circuits (synchronous counters and asynchronous counters).			

Module 9

Code	Course/Module Title	ECTS	Semester
CoE123	Object Oriented Programming	7	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	93	82
Description			
The Object-Oriented Programming (OOP) module aims to introduce students to the fundamental concepts and principles of object-oriented programming and enable them to apply these concepts in software development. The module aims to provide a solid understanding of the core principles of object-oriented programming, such as encapsulation, inheritance, polymorphism, and abstraction. Students will learn how these principles contribute to code organization, reusability, and maintainability.			

Module 10

Code	Course/Module Title	ECTS	Semester
CoE124	Engineering Design/ Auto CAD	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	47	53
Description			
This course aims to introduce students to the basic concepts of computer engineering drawing. AutoCAD software is used to draw engineering designs. The course includes knowledge about AutoCAD tools and their properties for developing different software designs in different applications. After completing this course, students are expected to become proficient in the main topics of Computer Drawing by AutoCAD and have the opportunity to explore current topics in the field.			

Module 11

Code	Course/Module Title	ECTS	Semester
CoE125	Device Physics	3	2

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		32	43
Description			
Gain a basic understanding of semiconductor material properties. Determine the properties of a pn junction including the ideal current–voltage characteristics of the pn junction diode. Examine dc analysis techniques for diode circuits. Develop an equivalent circuit for a diode that is used when a small, time-varying signal is applied to a diode circuit. Determine the operation of diode rectifier circuits, Zener diode voltage regulator circuit, clipper and clamper circuits. Analyze circuits that contain more than one diode. Understand the operation and characteristics of photodiode and light-emitting diode circuits. Study the structure, operation, and characteristics of MOSFETs and become familiar with the dc analysis of MOSFET circuits. Understand the operation and characteristics of the junction field-effect transistor and and analyze the dc response of JFET circuits. Develop the small-signal models of MOSFETs and analyze the common-source, source-follower, and common-gate amplifiers. Discuss the physical structure and operation of the bipolar junction transistor. Understand and become familiar with the dc analysis of BJT. Develop the small-signal models of BJTs and analyze the common-emitter, emitter-follower, and common-base amplifiers. Discuss the general frequency response characteristics of MOSFET and BJT amplifiers.			

Module 12

Code	Course/Module Title	ECTS	Semester
CoE126	English language II/ Technical Writing	3	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	43
Description			
The main aim of this module is to enable the student to communicate effectively and appropriately in real life situation using the English Language. Also, pronounce English Correctly and intelligibly.			

Module 13

Code	Course/Module Title	ECTS	Semester
CoE211	Calculus III	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	62	88
Description			
This course aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of mathematics and their use for problem solving and systems design in engineering. This mathematics course covers vector calculus, sequences and series, Laplace transform			

and partial differentiation it depends on the main topics of Math I and Math II courses. It can be as an introduction to study the topics of engineering analysis.

Module 14

Code	Course/Module Title	ECTS	Semester
CoE212	Discrete Structures	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	47	53
Description			
This course aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of discrete mathematics and structures and their use for problem solving and systems design in science and engineering. The course introduces the principles of Logic, set theory, relations, functions, number systems, and their operations, Introduces the principles of counting and its basic ways, such as permutations, combinations, and counting methods, Methods of proof and their mathematical laws, To think logically in reasoning and to use rapid methods of counting.			

Module 15

Code	Course/Module Title	ECTS	Semester
CoE213	Signals & Systems	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	62	63
Description			
This module aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of mathematics and mathematical analysis and their use for problem solving and systems design in science and engineering. The module introduces the principles of transforming systems and signals to mathematical equation, set theory, functions and their operations. It also introduces the principles of analyzing the equations into time domain and frequency domain and learning the transformation relations between each other. Also, this module gives the student the knowledge of the easiest way in the analyzing and obtaining the results in optimum way.			

Module 16

Code	Course/Module Title	ECTS	Semester
CoE214	Digital System Design	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	93	57
Description			
The aim of this course is to teach students how to analyze, design and implement digital systems using powerful techniques and tools, such as Programmable Logic Devices and Finite State Machines (FSMs),			

Understand the complex digital systems such as memory and programable logic devices, Analysis digital systems using various technologies, Design digital systems using combinational and sequential logic circuits.

Module 17

Code	Course/Module Title	ECTS	Semester
CoE215	Electrical Circuits 2	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	93	57
Description			
Understanding AC power concepts and terminologies, Familiarity with the various types of resonant circuits and their applications, Analysis of first and second order transient circuits, Understanding the concept of frequency response and transfer functions, Understanding the concept of two port networks and their different parameters, Study of the mutual inductance and magnetically coupled circuits.			

Module 18

Code	Course/Module Title	ECTS	Semester
CoE216	Human Rights, Democracy & Freedom	3	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	43
Description			
The fundamental role of human rights education in the realization of human rights that focus on understanding the "human rights education" as a learning process encompassing various dimensions: Knowledge and skills - learning about human rights standards and mechanisms, as well as acquiring the skills to put them into practice in daily life; Values, attitudes - developing values and reinforcing attitudes which uphold human rights; Behavior, action - encouraging action to defend and promote human rights Human rights education teaches both about human rights and for human rights. Its goal is to help students understand human rights, value human rights, and take responsibility for respecting, defending, and promoting human rights. An important outcome of human rights education is empowerment, a process through which people and communities increase their control of their own lives and the decisions that affect them. The ultimate goal of human rights education is people working together to bring about human rights, justice, and dignity for all.			

Module 19

Code	Course/Module Title	ECTS	Semester
CoE221	Differential Equations	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	62	63

Description
The construction of mathematical models to address real-world problems has been one of the most important aspects of each of the branches of science. It is often the case that these mathematical models are formulated in terms of equations involving functions as well as their derivatives. Such equations are called differential equations. If only one independent variable is involved, often time, the equations are called ordinary differential equations. The course will demonstrate the usefulness of ordinary differential equations for modeling physical and other phenomena. Complementary mathematical approaches for their solution will be presented, including analytical methods, graphical analysis and numerical techniques.

Module 20

Code	Course/Module Title	ECTS	Semester
CoE222	Probability and Statistics	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	62	63
Description			
This module aims to introduce students to this basic field of engineering sciences, which enables students to focus on studying mathematics and ways to clarify statistics for experiments or systems that are studied or analyzed and use them to solve problems and design systems in science and engineering such as calculating the rate and the amount of variance and others. The module introduces the principles of calculating the probability distribution and random variables such as the normal, exponential, uniform distribution, etc., and the operations that take place on them. It also introduces students to the principles of counting and its basic methods such as permutations, combinations, counting methods, and methods of proof and proof of mathematical laws. The module enables students to think logically in reasoning and to use rapid methods of counting.			

Module 21

Code	Course/Module Title	ECTS	Semester
CoE223	Microprocessor Programming	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	72
Description			
The aim of this course is to teach students the basic concepts of microprocessor-based systems, and introduces the assembly language for Intel x86 microprocessor family, Understand the main components and working principles of the Intel x86 microprocessor family, Program and debug in assembly language, Understand the basic computer architecture.			

Module 22

Code	Course/Module Title	ECTS	Semester
CoE224	Algorithms	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	72
Description			
This course aims to introduce students to this fundamental field of computer science and computer engineering, which enables students to focus on the study of data structures and programming background and make them expert in programming the common algorithms and data structures with full understanding to the complexity of each algorithm, using the JAVA and C++ programming languages. Most searching, sorting, and graph algorithms are covered in this course. The students will perform laboratory exercises in programming the commonplace algorithms in C++. The students will also be exposed to computation models and computational complexity.			

Module 23

Code	Course/Module Title	ECTS	Semester
CoE225	Digital Electronics	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	47	78
Description			
Understanding the design and analysis of digital electronic circuits depending on theoretical mathematical methods for design and analysis, introducing simulation programs (e.g., Multisim) for running digital circuits implementation to enhance practical capabilities, Best practicing the theoretical concepts through the implementation of small class projects to facilitate students' skills.			

Module 24

Code	Course/Module Title	ECTS	Semester
CoE226	Ethics, Society, Profession	3	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	43
Description			
Engineering ethics is the study of the ethical issues and decisions facing individuals and organizations working in the field of engineering. The purpose of studying the ethics of the engineering profession is to increase the engineer's ability to face the ethical issues that arise during his engineering work and responsibly. Any profession must have rules of ethics regulating the general behavior of the members of this profession with each other and with others. ABET has called for the integration of ethics into education to teach future engineers ethical practices and ethical thinking			

Module 25

Code	Course/Module Title	ECTS	Semester
CoE311	Linear Algebra	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	47	78
Description			
At its root, linear algebra is the study of systems of linear equations. Systems of linear equations are ubiquitous in the natural and social sciences. One major contribution to the topic was made by Gauss (1777–1855), who was confronted with large systems of linear equations in his work on astronomy and developed the famous method of least squares to cope with measurement errors. Later in the nineteenth century Cauchy, Sylvester, Cayley and others developed the concept of a matrix, which provides the most convenient language for the theory and practice of linear equations. Matrices are intricate algebraic objects with many fascinating properties, but they also provide a bridge between linear equations and vectors, so infusing the subject of linear algebra with a strong geometric flavor. We will delve into all these topics, as well as the notions of determinant and eigenvalues, which are important numbers associated with any square matrix.			

Module 26

Code	Course/Module Title	ECTS	Semester
CoE312	Computer Architecture	6	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
Learn the basic CPU structure the performance factors, Learn the algorithms to design of the common Fixed- Point arithmetic operations, Learn how to design High speed CPU execution components and arithmetic and logic unit, Learn the real number representations and the algorithms to design of the common floating- Point arithmetic operations, Understand the memory hierarchies, cache memories & their mapping techniques and polices, and other memories, Understand the types of system bus and the types of control unit, Learn how to design processor system consists of Datapath and control path.			

Module 27

Code	Course/Module Title	ECTS	Semester
CoE313	Operating Systems	6	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
This course aims to convey a thorough understanding of the basics of an operating system by studying techniques and algorithms for providing services in a computer system, and to understand			

implementation aspects of popular systems by means of case studies.

Module 28

Code	Course/Module Title	ECTS	Semester
CoE314	Artificial Intelligence	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	47	78
Description			
Starting with an understanding of the philosophical underpinnings of AI this module will explore advanced AI techniques via the application and evaluation of neural networks, Fuzzy Logic, genetic algorithms, local search techniques, and Hybrid Systems. The aim is to give students an appreciation of the types of application areas and problems that advanced AI techniques can enhance and optimize including artificial intelligence in control systems applications, artificial intelligence in modeling, artificial intelligence, and artificial intelligence in industrial control.			

Module 29

Code	Course/Module Title	ECTS	Semester
CoE315	Analog Electronics	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			
Understanding the design and analysis of analog op-amp electronic circuits depending on theoretical mathematical methods for design and analysis, introducing simulation programs (e.g. Multisim) for running some op-amp circuits implementation to enhance practical capabilities, Best practicing the theoretical concepts through the lab and implementation of small class projects to facilitate students skills.			

Module 30

Code	Course/Module Title	ECTS	Semester
CoE316	Engineering Economics	3	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	43
Description			
This course aims to introduce fundamental of Engineering Economics, which enables students to have knowledge on Making Economic Decision and how to select the best Alternative. The course deals			

with the principles of: Economics Science, Engineering Cost & Cost Estimating, Breakeven Analysis Time Value of Money & Cash Flow Diagrams, Simple and Compound Interests, Equivalence for Repeated Cash Flows, Present Worth Analysis, Annual Cash Flow Analysis, Future Worth, Rate of Return, Benefit-Cost Ratio, and Payback Period, Projects Evaluation to choose Best Alternative, Depreciation Principles and Analysis Methods, Renewable Energy Projects, Sustainability Issues.

Module 31

Code	Course/Module Title	ECTS	Semester
CoE321	Numerical Analysis	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	47	78
Description			
The main objective of this course is to provide students with an introduction to the field of numerical analysis. Aside from developing competency in the topics and emphases listed above, the course aims to: further develop and apply problem solving skills through the introduction of numerical methods; provide a ground for applying knowledge acquired in previous mathematics courses; and give students an opportunity to develop and present an independent project.			

Module 32

Code	Course/Module Title	ECTS	Semester
CoE322	Microprocessor Interface	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47
Description			
Learning the basic concepts of memory and input and output interfaces, learning how to design memory subsystem and input and output ports, designing programs for managing input and output data, understanding the operation of programmable input and output devices, the ability to implement hardware designs for specific problems, the ability to interact with hardware designs through software, the ability to design dedicated and general-purpose ports, both fixed and programmable, the ability to handle interrupts and transfer data to and from the CPU.			

Module 33

Code	Course/Module Title	ECTS	Semester
CoE323	Instrumentation	4	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	68
Description			

Principle of measurement, Measuring electrical quantities, Analogue and digital transducers, Measurement of level, pressure, flow, temperature and other industrial measurements, Operation principle of DC, Servo, and Steeper motors.

Module 34

Code	Course/Module Title	ECTS	Semester
CoE324	Digital Communication	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
This course reviews the theory of Digital communication systems including different types of modulations, encoding and multiplexing techniques. It also demonstrates the performance of digital systems and the guided and unguided transmission media. Cellular networks are also included.			

Module 35

Code	Course/Module Title	ECTS	Semester
CoE325	Computer Maintenance	4	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	47	53
Description			
Introducing hardware concepts to a student, Early detection of computer problems, Define a computer as an electronic machine that can store information Design input/output ports with specific addresses. Identify commonly used computer devices and explain their usage of Programmable timers, give a strong foundation on the most fundamental concepts of computer hardware and operating systems, Explain the purpose of the most commonly used hardware devices, Assemble a computer system, Configure and troubleshoot hardware devices.			

Module 36

Code	Course/Module Title	ECTS	Semester
CoE326	Digital Signal Processing	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
Clarify the basic concepts of Fundamentals of discrete time signals systems, gain new skills relationships between system representations, Gain basic skills in computation of frequency response. Gain basic understanding of discrete system programming and Digital filter design.			

Module 37

Code	Course/Module Title	ECTS	Semester
CoE411	Embedded Computing Systems	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
Clarify the concepts associated with real time system regarding resource management, Clarify the requirements to establish a real time project using embedded system, Acquire the basic skills for synchronizing the process in foreground and background aspects, Acquire basic skills for interfacing, Synchronous serial interface and I/O programming, Acquiring the skills to Analog to digital conversion, Real-time data acquisition, Digital to analog conversion, Gain the skills required to build a networked embedded system, Reentrant programming, Critical section, Network topologies.			

Module 38

Code	Course/Module Title	ECTS	Semester
CoE412	Computer Network	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
Introduction to the design and performance analysis of computer networks Architectures, protocols, standards and technologies of computer networks. Including different computer networks types, media, models, switching, retransmission, flow and error control.			

Module 39

Code	Course/Module Title	ECTS	Semester
CoE413	Control Systems	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	77
Description			
Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in control engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. Providing distinguished academic programs in the field of control engineering, both theoretical and			

practical, that comply with international standards of academic quality and meet the needs of the labor market. Encouraging and developing scientific research in the fields of control engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.

Module 40

Code	Course/Module Title	ECTS	Semester
CoE4P	Engineering Project (continued)	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	77	48
Description			
As we know projects can influence an engineering curriculum in various ways, and this can be done at a course level and/or program level. Therefore, in the final year our students complete an individual project involving the application of skills and knowledge attained during their earlier years of their degree program. Through these projects students develop new abilities for application to a real-world problem, learn the art of modeling and simulation, design, development and management of an industry or research-based projects.			

Module 41

Code	Course/Module Title	ECTS	Semester
CoE414	Project management	3	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	43
Description			
This course is intended as an introduction to the different concepts, skills, tools, and techniques needed to successfully manage projects of various types and sizes, with focus on projects involving Computer Engineering. Course material covers the approaches and practices in project management over the life cycle of the project. This course is highly interactive, with hands-on, in-class practice projects and analysis of real-world project examples. While providing the knowledge needed for project planning, monitoring, and control, it focuses on the development of leadership, teamwork, and problem solving skills.			

Module 42

Code	Course/Module Title	ECTS	Semester
CoE415	Image Processing	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62

Description
Understanding the principles and mathematics of several techniques and algorithms needed in the field of image processing and computer vision. Programming these methods and algorithms with some languages (e.g. MATLAB or Python) to enhance practical capabilities. Best practicing the theoretical concepts through the lab and implementation of small class projects to facilitate students skills.

Module 43

Code	Course/Module Title	ECTS	Semester
CoE421	Information Security	4	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	68
Description			
To broaden knowledge of security concepts and practices, To demonstrate the expertise as a seasoned security professional, To make students more marketable in a competitive workforce, To make students be eligible for more employment opportunities, To bring improved security expertise to the student's future occupation, To show a dedication to the security discipline, Introducing software programs for running some attack implementation to enhance practical capabilities, Best practicing the theoretical concepts through the implementation of small class projects to facilitate students skills.			

Module 44

Code	Course/Module Title	ECTS	Semester
CoE422	Software Design	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
To acquire skills to develop large programs, handling exponential growth in complexity with size, Systematic techniques based on abstraction (modelling) and decomposition, learn systematic techniques of specification, design, user interface development, testing, project management, maintenance, etc., appreciate issues that arise in team development, to acquire skills to be a better programmer, Higher productivity, better quality programs.			

Module 45

Code	Course/Module Title	ECTS	Semester
CoE423	Networks Technology	5	8

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
Understanding the ability of network problem solving, Obtain the ability of connecting networks Knowledge, Obtain the ability of analyzing networks, the ability of estimating network requirements. The ability to deal with information systems, The ability to analyze different problems in the network and problems fixing, the ability to design a network for a given purpose, The ability to write technical reports.			

Module 46

Code	Course/Module Title	ECTS	Semester
CoE424	Parallel Processing Architecture	3	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3		47	78
Description			
Students will gain fundamental knowledge and understanding of principles in parallel computer architecture and computing, emphasizing the hardware challenges, Analyze the parallelism, Identify the conditions of parallelism, Study different parallel interconnection systems, Identify the memory types in parallel processing systems, understanding pipelined and non-pipelined processing, Identify the pipeline system and pipeline hazards, Gain in-depth knowledge of parallel computer architecture. Learn parallel.			

Module 47

Code	Course/Module Title	ECTS	Semester
CoE4P	Engineering Project	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	77	48
Description			
As we know projects can influence an engineering curriculum in various ways, and this can be done at a course level and/or program level. Therefore, in the final year our students complete an individual project involving the application of skills and knowledge attained during their earlier years of their degree program. Through these projects students develop new abilities for application to a real-world problem, learn the art of modeling and simulation, design, development and management of an industry or research-based projects.			

Module 48

Code	Course/Module Title	ECTS	Semester
CoE425	Discrete Control Systems	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
The objective of this course is to introduce the students to the fundamental principles of discrete time control system. Introduction to discrete time control system, z transforms and inverse z transform, impulse sampling and data hold, pulse transfer function, time response and frequency response are studied. The performance of systems and the stability analysis will also be introduced.			

Contact

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electrical Circuits 1			**Module Delivery**	
Module Type	Support			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE112				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Computer Engineering		**College**	Collage of Engineering	
Module Leader	Ali Mohammed Ahmed		**e-mail**	ali.ahmed@uobasrah.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**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	1. Understanding basic circuit components, such as resistors, capacitors, and inductors, and their properties. 2. Familiarizing with various types of circuits, such as series, parallel, and combination circuits. 3. Analyzing DC circuits using different analysis techniques. 4. Analyzing AC circuits using complex impedance and phasor notation. 5. Understanding the behavior of circuits with reactive components. 6. Understanding the concept of power and energy in circuits. 7. Developing practical skills in designing and building basic electrical circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Describe electrical power, charge, and current. 5. Define Ohm's law. 6. Identify the basic circuit elements and their applications. 7. Discuss the operations of sinusoid and phasors in an electric circuit. 8. Discuss the various properties of resistors, capacitors, and inductors. 9. Explain the two Kirchhoff's laws used in circuit analysis. 10. Identify the capacitor and inductor phasor relationship with respect to voltage and current.
Indicative Contents المحتويات الإرشادية	<u>Part A: (Theoretical and Tutorial Hours)</u> 1. DC circuits – Current and voltage definitions, Passive sign convention and circuit elements [6 hours] 2. Resistive networks, Combining resistive elements in series and parallel and Network reduction [6 hours] 3. Kirchhoff's laws and Ohm's law [6 hours] 4. voltage and current sources, current and voltage division [4 hours] 5. Introduction to mesh and nodal analysis [6 hours] 6. Thevenin and Norton equivalent circuits. maximum power transfer [6 hours] 7. Time dependent signals, average and RMS values. [4 hours] 8. simple AC steady-state sinusoidal analysis [6 hours] 9. RMS and power dissipation [2 hours] 10. Phasor diagrams, definition of complex impedance [6 hours] 11. AC circuit analysis with complex numbers. [6 hours]

	Part B: (Lab Hours) 1. Resistors and color codes [2 hours] 2. Ohm's law [2 hours] 3. Series and parallel resistive networks [4 hours] 4. Kirchhoff's laws [4 hours] 5. Delta -Star and Star –Delta Transformation [4 hours] 6. Wheatstone bridge [2 hours] 7. Superposition theorem [4 hours] 8. Thevenin equivalent circuits [4 hours] 9. Maximum power transfer [4 hours]

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	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 9
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	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	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – charge, current, and voltage
Week 2	Basics of Network Elements
Week 3	Resistance and Resistivity, Ohm's Law
Week 4	Review of Kirchhoff's Laws
Week 5	Nodal and Mesh Circuit Analysis
Week 6	Linearity and Superposition
Week 7	Mid-term Exam + Thévenin and Norton Equivalents
Week 8	Source Transformations
Week 9	Introduction to alternative current
Week 10	Sinusoidal voltages and currents
Week 11	Phasors, and Complex Impedance
Week 12	Average Power and RMS
Week 13	Sinusoidal Steady State Response
Week 14	Sinusoidal Forcing, Complex Forcing, ,
Week 15	Nodal and Mesh Revisited
Week 16	**Preparatory week before the final Exam**

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

Week 1	Lab 1: Resistors and color codes
Week 2	Lab 2: Ohm's law
Week 3	Lab 3: Series and parallel resistive networks
Week 4	Lab 4: Series and parallel resistive networks (continued)
Week 5	Lab 5: Kirchhoff's laws
Week 6	Lab 6: Kirchhoff's laws [continued]
Week 7	Lab 7: Delta -Star and Star –Delta Transformation
Week 8	Lab 8: Delta -Star and Star –Delta Transformation (continued)
Week 9	Lab 9: Wheatstone bridge
Week 10	Lab 10: Superposition theorem
Week 11	Lab 11: Superposition theorem (continued)
Week 12	Lab 12: Thevenin equivalent circuits
Week 13	Lab 13: Thevenin equivalent circuits (continued)
Week 14	Lab 14: Maximum power transfer
Week 15	Lab 15: Maximum power transfer (continued)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	Introductory Circuit Analysis, R. Boylestad, Pearson	Yes
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Industrial Chemistry			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		1	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	Mohannad H. Al-Ali		**e-mail**	mohannad.khalaf@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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	Describe the fundamental issues of chemical reactions, equilibrium and kinetics. Study the considerations of industrial chemistry such as reaction evaluation and types of industrial reactors. Depict the chemistry of gas and petroleum. Elaborate on the chemistry of ethylene and propylene and treat the C4 and C5 olefins. Discuss the chemistry of the benzene, toluene, and the xylenes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learn about the basics of chemicals relations such as stoichiometry, equilibrium and thermal energy. 2. Accounting to industrial considerations in the chemical yields and catalysis. 3. Learn about synthesis gas production and stream reforming. 4. Get knowledge about the stages of petroleum refining. 5. Obtain concise information on petrochemical industry, including ethylene and propylene-based processes, C4-Based Processes, and Benzene, Toluene, and Xylenes (BTX) Processes.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Fundamentals, Chemical Reactions: Stoichiometry, reaction yields, thermochemistry. Equilibrium: Equilibrium constants, LeChatlier's principle. Kinetics: Rate expressions, temperature effects, catalysis. 2. Industrial Considerations, Reaction Evaluation: Selection, economic feasibility, thermodynamic feasibility, kinetic feasibility. Types of Industrial Reactors: Single and multiple products without separation, single product with separation, multiple separations involving reactor feed and product streams, and reactor with recycle. 3. Synthesis Gas Processes, Synthesis Gas Production: Steam reforming, shift reactions, and Methanation. Ammonia: Synthesis, oxidation: Nitric acid and fertilizers. Methanol: Synthesis, derivatives: Formaldehyde and acetic acid. 4. The Petroleum Industry, Petroleum Refining: Composition, distillation, catalytic cracking, catalytic reforming, hydrotreating and coking, alkylation and isomerization, steam cracking. 5. The Petrochemical Industry, Ethylene-Based Processes: Ethylene oxide and ethylene glycol, polyethylene, vinyl chloride and PVC. Propylene-Based Processes: Acrylic acid and acrylonitrile, PP and Ziegler-Natta chemistry. C4-Based Processes: Butadiene, Isobutylene. Benzene, Toluene, and Xylenes (BTX) Processes: Styrene and polystyrene, polyethylene terephthalate (PET), Phenol, adipic acid and nylon, phthalic anhydride.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Class lectures. 2. Tutoring. 3. Homework. 4. quizzes 5. Mid-term and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.86
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	5, 10	LO # 1-5
	Assignments	6	20% (20)	2, 4, 6, 8, 10, and 12	LO # 1-5
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-3
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	1. Fundamentals: Chemical Reactions
Week 2	1. Fundamentals: Equilibrium
Week 3	Industrial Considerations: Reaction Evaluation
Week 4	Industrial Considerations: Types of Industrial Reactors
Week 5	Synthesis Gas Processes: Synthesis Gas Production and Steam Reforming
Week 6	Synthesis Gas Processes: Ammonia: Synthesis, oxidation
Week 7	Synthesis Gas Processes: Methanol Synthesis and Conversion
Week 8	Petroleum Refining: Composition, distillation, catalytic cracking, catalytic reforming, hydrotreating and coking
Week 9	Petroleum Refining: Alkylation and isomerization, steam cracking.
Week 10	Ethylene-Based Processes: Ethylene oxide and ethylene glycol, polyethylene, vinyl chloride and PVC.
Week 11	Propylene-Based Processes: Acrylic acid and acrylonitrile, PP and Ziegler-Natta chemistry.
Week 12	C4-Based Processes: Butadiene, Isobutylene
Week 13	BTX Processes: Styrene, Polystyrene
Week 14	BTX Processes: Polyethylene Terephthalate (PET), Phenol
Week 15	BTX Processes: Adipic Acid and Nylon, Phthalic anhydride.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	H. A. Wittcoff, B. G. Reuben, and J. S. Plotkin, "Industrial Organic Chemistry". USA: A john Wiley & Sons, Inc., 3rd ed., 2013. K. Weissermel and Dr. H.-J. Arpe, "Industrial Organic Chemistry". USA: VCH publisher, 5th ed., 2010.	Yes
Recommended Texts		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	Calculus I			**Module Delivery**	
Module Type	Base			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE111				
ECTS Credits	07				
SWL (hr/sem)	175				
Module Level		1	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Wasan A. Wali		**e-mail**	Wasan.wali@@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	Calculus II	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Calculus gives engineers the ability to model and control systems. It provides a way to construct relatively simple quantitative and deduce their consequences and the ability to find the effects of changing conditions on the system being investigated. This semester reviews the basic ideas a student need to start calculus for engineering. Topics include a brief review of functions, followed by a discussion of limits, derivatives, and applications of differential calculus to real-world problem areas. An introduction to integration concludes the course, with a brief description of complex geometry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Illustrate the principle of calculus. 2- Improve the ability to analyze and problem-solving approach. 3- Gain the required mathematical skills to solve different problems. 4- Cognitive development of the student by improving his/her learning through adopting a deep learning approach (focusing and understanding). 5- Improve the essential skills to treat with different mathematical problems. 6- Help students grasp the development of knowledge as a process. 7- Improve the writing of scientific reports. 8- Gain the required experience to deal with real-time and industrial systems applications mathematically.
Indicative Contents المحتويات الإرشادية	**Course Topics:** 1- **Preliminaries:** • Real numbers and the real line, lines, circles, and parabolas, functions and their graphs. **(4hrs)** • Absolute value function, greatest integer function, signum function, domain and range algebraic functions.**(4hrs)** • Combining functions, shifting and scaling function graphs, even and odd functions. **(4hrs)** • Trigonometric functions. **(4hrs)** 2- **Differentiation:** • Limits, continuity and differentiability. **(4hrs)** • Rules of Differentiation, chain rule, implicit differentiation. **(4hrs)** • Higher order differentiation. **(4hrs)** • Application, time rate, maxima and minima, concave, curve plotting. **(4hrs)** • Inverse functions, the limit sinx/x, trigonometric functions and their inverse. **(4hrs)** 3- **Integration:** • Finite integration, rules of integration. **(4hrs)** • Applications, area, volume, arc-length. **(4hrs)** • Integration methods, special integrals, rotating and shifting of axes, conical sections. **(4hrs)** 4- **Complex Geometry:** • Complex numbers: z = x +jy as an affix on the real point.(x y), modulus, argument, conjugate, addition, subtraction, products of such numbers. **(4hrs)**

	• (Cartesian, trigonometric, polar and exponential) forms. **(4hrs)** • Transformations: translation, rotation by an angle. **(4hrs)**

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1- Explanation and clarification using the class lectures. 2- Tutorials hours. 3- Reading and self-learning. 4- Home Works. 5- Discussions and workshops 6- Reports. 7- Presentation. 8- Short tests (quizzes). 9- Training and activities during lecture. 10- Mid-terms and final exams. 11- Encourage the student to: • Fully present in class. • Asking the questions that help to understand the material better. • Interaction during lectures • Practicing the examples, homework, and problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	113	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6, 10	LO #1, 2, 4 and 6
	Assignments	3	15% (15)	3, 12	LO #2, 3, 4,5 and 6
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	14	LO # 4, 5,7 and 8
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Preliminaries: Real numbers and the real line, lines, circles, and parabolas, functions and their graphs.
Week 2	Absolute value function, greatest integer function, signum function, domain and range algebraic functions.
Week 3	Preliminaries: Combining functions, shifting and scaling function graphs, even and odd functions.
Week 4	Preliminaries: Trigonometric functions.
Week 5	Differentiation: Limits, continuity and differentiability
Week 6	Differentiation: Rules of Differentiation, chain rule, implicit differentiation.
Week 7	Differentiation: Higher order differentiation.
Week 8	Differentiation: Application, time rate, maxima and minima, concave, curve plotting.
Week 9	Differentiation: Inverse functions, the limit sinx/x, trigonometric functions and their inverse.
Week 10	Integration: Finite integration, rules of integration.
Week 11	Integration: Applications, area, volume, arc-length.
Week 12	Integration: Integration methods, special integrals, rotating and shifting of axes, conical sections.
Week 13	Complex Geometry: Complex numbers: z = x +jy as an affix on the real point.(x y), modulus, argument, conjugate, addition, subtraction, products of such numbers.
Week 14	Complex Geometry: (Cartesian, trigonometric, polar and exponential) forms.
Week 15	Complex Geometry: Transformations: translation, rotation by an angle.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus, By Anton Bivens Davis, 2002 Anton Textbooks, Inc	Yes
Recommended Texts	Advanced Engineering Mathematics, By Erwin Kreyszig, 1999, John Wiley & Sons, Inc	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	English Language I			**Module Delivery**	
Module Type	Support or related learning activity			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE116				
ECTS Credits	3				
SWL (hr/sem)	32				
Module Level		2	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Sarah Aziz Al-Hilfi		**e-mail**	sara.aziz@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**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	The main aim of this module is to enable the student to use the English language effectively for study purposes across the curriculum. Also, to develop and integrate the use of the four language skills: Reading, Listening, Speaking and Writing to revise and reinforce structure already learnt. The module presents the following principles that related to both writing and reading skills: 1. The ability to write English correctly. 2. Master the Mechanics of academic writing; for example, using correct punctuation marks, capital letters, etc... 3. Writing neatly and legibly using the appropriate vocabulary and the correct grammatical items. 4. Writing coherently in more than one paragraph, complete accurately and fluently semi-controlled compositions such as events, trends, and processes. 5. understanding the total content and underlying meaning in the context. 6. Follow the sequence of ideas, facts etc... 7. locate Significant points and features. 8. identifying and understanding phrase or sentence groups. 9. predict outcomes. 10. grasp meaning of words and sentences
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the academic writing techniques and creative uses of language in academic texts. 2. Adapt their texts to particular audiences and purposes. 3. Articulate a thesis, a project or a report and present evidence using the suitable vocabulary to support it. 4. Finding, evaluating, and using appropriate bibliographic materials in their texts. 5. Describe their own writing practices and how they have evolved. 6. Apply relevant theoretical concepts to their texts and practices.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Grammars. [6 hrs] 2. Reading. [4 hrs] 3. Writing. [4 hrs] 4. Describing Charts vocabulary and words order . [16 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects.

	4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, and 3
	Assignments	3	15% (10)	2, 6, 10	LO # 3, 4, and 5
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 2, 3,4 and 5
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-5
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Singular and Plural Nouns
Week 2	English Tenses Part I
Week 3	English Tenses Part II
Week 4	Prepositions and Modal Verbs
Week 5	Compound nouns and Compound Adjectives

Week 6	Academic Writing
Week 7	Trends
Week 8	Describing Trends
Week 9	Describing Trends, vocabulary, and word order.
Week 10	Tables and bar charts
Week 11	Describing Tables and bar charts, vocabulary, and word order.
Week 12	Pie Charts
Week 13	Describing Pie Charts, vocabulary, and word order.
Week 14	Describing Projections
Week 15	Formal and informal Email Writing
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Headway Academic Skills	Yes
Recommended Texts	All versions of Headway	Yes
Websites	British Council, Learn English online	

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	Fundamentals of Logic systems			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE114				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Computer Engineering		**College**	Collage of Engineering	
Module Leader	Dr. Atheel K. Abdulzahraa		**e-mail**	atheel.abdulzahraa@uobasrah.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**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 enable the student to learn basics of digital systems design: 1. Numbering Systems and Conversion between different number systems. 2. Mathematical Operations of different number systems. 3. Principles and laws of Boolean algebra. 4. Simplification logical functions using K-Map. 5. Design the Logic circuits. 6. Coding systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the numbering systems (binary, decimal numbers, octal, hexadecimal and etc.). 2. Identify the methods of conversion between the number systems. 3. Identify the mathematical Operations of different number systems (Add, Subtract, Multiply and Division). 4. Identify the basics and rules of Boolean algebra. 5. Identify on the Karnaugh- Maps and using them in simplification the logic circuits. 6. Identify the codes and the conversion between them.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Knowledge of number systems and conversion between them. [6 hrs] 2. Knowledge of the mathematical Operations of different number systems. [6 hrs] 3. Knowledge of Complements of different Number systems and knowledge of Binary Logic Gates. [3 hrs] 4. Knowledge the basics and the laws of Boolean algebra and using it to simplify logic circuits. [6 hrs] 5. Knowledge the implementation of the logic functions as the canonical forms SoP and Pos. [3 hrs] 6. Discussion. [3 hrs] 7. Knowledge the design of Karnaugh- maps and Don't care terms. [6 hrs] 8. Using the Karnaugh- maps to simplify and design the logic circuits. [3 hrs] 9. Knowledge of types of Codes, mathematical operations on them and conversion between them. [6 hrs] 10. Discussion. [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	78	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, 5 and 7
	Assignments	3	15% (15)	2, 6, 10	LO # 1, 3, 5 and 6
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 4, 5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Digital Systems [Decimal, Binary, Octal, Hexadecimal, etc.] and Number – Base Conversions.
Week 2	Arithmetic operations.
Week 3	Complements of Numbers.
Week 4	Binary Logic Gates and Discussion.
Week 5	Basic Definition and Rules of Boolean Algebra.
Week 6	Canonical and Standard Forms [sum of products, product of sums].
Week 7	Mid-term Exam + Discussion.
Week 8	The Karnough Map Method.
Week 9	Don't-Care Terms.
Week 10	NAND and NOR Implementation.
Week 11	Logic Circuits.
Week 12	Discussion.
Week 13	Weighted Codes [BCD, etc.].
Week 14	Ex – n Codes and Gray code.
Week 15	Design of different codes.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of logic design. Cengage Learning by Roth Jr, Charles H., Larry L. Kinney, and Eugene B. John.	Yes
Recommended Texts	Digital computer fundamentals. McGraw-Hill, Inc, by Bartee, Thomas C.	Yes
Websites	https://www.coursera.org/lecture/build-a-computer/unit-1-3-logic-gates-Aqrh6	

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
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Programming and Problem Solving**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CoE113**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Computer Engineering		**College**	Collage of Engineering	
Module Leader	Dhayaa R. Khudher		**e-mail**	dhayaa.khudher@uobasrah.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**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	The Programming and Problem-Solving module focuses on developing skills in programming and problem-solving techniques. This module aims to provide students with a solid foundation in computer programming concepts and the ability to apply these concepts to solve real-world problems. Throughout the module, students will learn various programming languages, such as C++. They will gain a thorough understanding of fundamental programming concepts like variables, data types, control structures (loops and conditionals) and functions. The module may cover the following topics: 1- Introduction to programming: Basic programming concepts, syntax, and logic. 2- Data types and variables: Working with different data types such as numbers, strings, and boolean values. Understanding variables and their usage. 3- Control structures: Implementing decision-making statements (if-else, switch-case) and loops (for, while) to control program flow. 4- Functions and modular programming: Creating reusable code blocks through functions and organizing code into modules. Throughout the module, students will have hands-on programming assignments and projects to reinforce their understanding of the concepts taught. They will practice problem-solving skills by tackling programming challenges and implementing solutions using the learned programming techniques. By the end of the module, students should be proficient in at least one programming language and have the ability to approach and solve complex problems using programming and problem-solving strategies. These skills are essential for further studies in computer science and for careers in software development and related fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completing the Programming and Problem-Solving module, students should be able to demonstrate the following learning outcomes: 1- Programming Skills: Students will acquire proficiency in at least one programming language and demonstrate the ability to write well-structured and functional code. They should be able to understand and apply programming concepts, syntax, and language features. 2- Problem-Solving Abilities: Students will develop effective problem-solving skills by analyzing complex problems, breaking them down into smaller components, and designing step-by-step solutions using programming techniques. They should be able to apply appropriate algorithms and data

	structures to solve different types of problems efficiently. 3- Logical Thinking: Students will develop logical thinking abilities by understanding and implementing control structures, such as loops and conditionals, to control the flow of a program. They should be able to reason about the behavior of a program and identify potential errors or bugs. 4- Modularity and Reusability: Students will learn to create modular and reusable code through the use of functions or methods. They should understand the benefits of code organization and be able to effectively use modular programming techniques to enhance the maintainability and readability of their code. These learning outcomes collectively equip students with the necessary skills and knowledge to apply programming and problem-solving techniques effectively in various contexts, including further studies in computer science and careers in software development or related fields.
Indicative Contents المحتويات الإرشادية	The indicative contents of the Programming and Problem-Solving module may include the following topics: 1. Introduction to Programming • Basic programming concepts and terminology • Introduction to programming languages (e.g., Python, Java, C++) • Setting up the development environment 2. Data Types and Variables • Primitive data types (e.g., integers, floats, strings, booleans) • Variable declaration and assignment • Type conversions and casting 3. Control Structures • Conditional statements (if-else, switch-case) • Looping structures (for, while, do-while) • Nested loops and loop control statements (break, continue) 4. Functions and Modular Programming • Defining and calling functions • Function parameters and return values • Modular code organization and reuse 5. Algorithms and Problem-Solving Techniques • Introduction to algorithm analysis and efficiency (time complexity, space complexity) • Searching algorithms (linear search, binary search)

	• Sorting algorithms (selection sort, insertion sort, merge sort, quicksort) • Recursion and recursive algorithms 6. Error Handling and Debugging • Common types of errors (syntax errors, runtime errors) • Debugging techniques and tools • Exception handling (try-except blocks) • Error messages and logging • Software Development Practices 7. Software development life cycle (SDLC) • Version control systems (e.g., Git) • Testing methodologies (unit testing, integration testing) • Code documentation and commenting 8. Problem-Solving Strategies and Patterns • Breaking down complex problems into manageable components • Problem-solving patterns (e.g., brute force, divide and conquer, dynamic programming) • Applying appropriate algorithms and data structures to solve problems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In the Programming and Problem-Solving module, students can employ various strategies to enhance their learning experience and improve their programming and problem-solving skills. Some effective strategies include: 1. Practice and Hands-on Coding: Regular practice is crucial for mastering programming concepts. Students should actively engage in coding exercises, programming assignments, and projects. Practicing coding helps reinforce understanding, improves syntax familiarity, and builds problem-solving skills. 2. Break Down Problems: Encourage students to break down complex problems into smaller, manageable components. This strategy helps in understanding the problem better and enables step-by-step solutions. Students can use techniques like pseudocode or flowcharts to visualize and plan their approach. 3. Debugging and Troubleshooting: Debugging is an essential skill for programmers. Students should develop the ability to identify and fix errors in their code systematically. Encourage them to use debugging tools, print statements, and step-through debugging techniques to locate and rectify issues. 4. Collaborative Learning: Foster a collaborative learning environment where students can work together, share ideas, and discuss solutions. Group projects or coding exercises can facilitate collaboration, allowing students to learn from

	each other, solve problems collectively, and gain exposure to different perspectives and approaches. 5. Seek Help and Resources: Encourage students to seek help when needed. They can consult the course instructor, teaching assistants, or online resources such as documentation, tutorials, and programming forums. Encouraging them to explore different resources broadens their understanding and exposes them to different problem-solving techniques. 6. Test and Debug Incrementally: Advise students to test and debug their code incrementally as they develop their solutions. By testing and verifying smaller parts of the code before proceeding to the next section, they can identify and fix errors early, reducing the complexity of debugging later. 7. Analyze and Optimize Algorithms: Teach students to analyze algorithms in terms of time and space complexity. They should understand the efficiency trade-offs of different algorithms and data structures and be able to select the most appropriate solution for a given problem. 8. Read and Analyze Code Examples: Encourage students to read and analyze code examples, both simple and complex. This practice helps them understand different programming techniques, coding patterns, and best practices employed by experienced programmers. They can also gain insights into problem-solving approaches. 9. Reflect and Review: Incorporate regular opportunities for students to reflect on their learning progress and review their code. This reflection and review process helps them identify areas for improvement, reinforce concepts, and solidify their understanding of programming principles. 10. Stay Updated and Explore Further: Programming languages and technologies evolve rapidly. Encourage students to stay updated with the latest developments and explore additional resources beyond the curriculum. They can explore new programming languages, libraries, frameworks, or online coding challenges to expand their skills and knowledge. By employing these strategies, students can enhance their learning experience, strengthen their programming and problem-solving skills, and become more proficient and confident programmers.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	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	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Programming
Week 2	Programming Environment Setup
Week 3	Basic Syntax and Output Statements
Week 4	Variables and Data Types
Week 5	Input and Conditional Statements
Week 6	Loops and Iteration
Week 7	Arrays and List Data Structures
Week 8	Functions and Modular Programming

Week 9	Parameters and Return Values
Week 10	Debugging Techniques
Week 11	Introduction to algorithm analysis and efficiency (time complexity, space complexity)
Week 12	Searching algorithms (linear search, binary search)
Week 13	Sorting algorithms (selection sort, insertion sort, merge sort, quicksort)
Week 14	Recursion and recursive algorithms
Week 15	Error Handling and Debugging
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Programming Environment Setup
Week 2	Structure of the Program
Week 3	Basic Syntax and Output Statements (Declaration and Initialization)
Week 4	Variables and Data Types (Constant, Strings, and Operators)
Week 5	Conditional Statements (IF and Else)
Week 6	Loops and Iteration (While Loop, Do Wile Loop, For Loop)
Week 7	Arrays and List Data Structures
Week 8	Functions and Modular Programming
Week 9	Parameters and Return Values
Week 10	Debugging Techniques
Week 11	Introduction to algorithm analysis and efficiency (time complexity, space complexity)
Week 12	Searching algorithms (linear search, binary search)
Week 13	Sorting algorithms (selection sort, insertion sort, merge sort, quicksort)
Week 14	Recursion and recursive algorithms
Week 15	Error Handling and Debugging

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	C++ Primer, 5th Edition by Stanley B. Lippman, Josée Lajoie, Barbara E. Moo	Yes
Recommended Texts	C++ Programming: From Problem Analysis to Program Design. Fifth Edition. D.S Malik	No
Websites	1. https://www.geeksforgeeks.org/ 2. https://github.com/ 3. https://www.khanacademy.org/ 4. https://www.codecademy.com/	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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	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	Device Physics			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE 125				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	Mohannad H. Al-Ali		**e-mail**	mohannad.khalaf@uobasrah.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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	1. Gain a basic understanding of semiconductor material properties. Determine the properties of a pn junction including the ideal current–voltage characteristics of the pn junction diode. Examine dc analysis techniques for diode circuits. Develop an equivalent circuit for a diode that is used when a small, time-varying signal is applied to a diode circuit. 2. Determine the operation of diode rectifier circuits, Zener diode voltage regulator circuit, clipper and clamper circuits. Analyze circuits that contain more than one diode. Understand the operation and characteristics of photodiode and light-emitting diode circuits. 3. Study the structure, operation, and characteristics of MOSFETs and become familiar with the dc analysis of MOSFET circuits. Understand the operation and characteristics of the junction field-effect transistor and and analyze the dc response of JFET circuits. 4. Develop the small-signal models of MOSFETs and analyze the common-source, source-follower, and common-gate amplifiers. 5. Discuss the physical structure and operation of the bipolar junction transistor. Understand and become familiar with the dc analysis of BJT. 6. Develop the small-signal models of BJTs and analyze the common-emitter, emitter-follower, and common-base amplifiers. Discuss the general frequency response characteristics of MOSFET and BJT amplifiers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the concept of intrinsic carrier concentration, the difference between n-type and p-type materials, and the concept of drift and diffusion currents. Analyze a diode circuit using the piecewise linear model for the diode. Determine the small-signal characteristics of a diode using the small-signal equivalent circuit. 2. Analyze diode rectifier circuits, Zener diode circuits, clipper and clamper circuits, and circuits with multiple diodes. 3. Describe the structure and general operation of n-channel and p-channel MOSFETs. Apply the (non)ideal current–voltage relations in the dc analysis of MOSFET circuits. Understand the dc analysis and design of a multistage MOSFET circuit. Understand the general operation and characteristics of junction FETs. 4. Describe the small-signal equivalent circuit of the MOSFET and determine the values of the small-signal parameters. Apply the MOSFET small-signal equivalent circuit in the analysis of multistage amplifier circuits. Describe the operation and analyze basic JFET amplifier circuits. 5. Describe the structure and general current–voltage characteristics for both the npn and pnp bipolar transistors. Define the four modes of operation of a bipolar transistor. Apply the dc analysis to multistage transistor circuits. 6. Describe the small-signal equivalent circuit of the bipolar transistor and determine the values of the small-signal parameters. Apply the small-signal equivalent circuit to various bipolar amplifier circuits. Apply the bipolar small-signal equivalent circuit in the analysis of multistage amplifier circuits. Construct the Bode plots for the frequency response of MOSFET and BJT.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Semiconductor Materials and Properties: Intrinsic and extrinsic semiconductors, drift and diffusion currents, excess carriers.

	2. The pn Junction: Reverse-biased pn Junction, forward-biased pn Junction, ideal current–voltage relationship. Diode DC Analysis: Piecewise linear model. Diode AC Equivalent Circuit: Small-signal equivalent circuit. 3. Diode Circuits: Rectifier circuits, Zener diode circuits, clipper and clamper circuits, Multiple-diode circuits, photodiode and LED circuits. 4. MOSFET: Structure, regions of operation, ideal and non-ideal current-voltage characteristics, common-source circuit, cascade and cascode configurations. Junction Field-Effect Transistor: pn JFET and MESFET Operation, current-voltage characteristics, DC analysis. MOSFET as a switch. 5. The MOSFET Amplifier: Small-signal equivalent circuit, common-source amplifier, common-drain amplifier, common-gate configuration, cascade and cascode circuits. Basic JFET Amplifiers: Small-signal equivalent circuit. 6. Basic Bipolar Junction Transistor: Structure, operation modes, ideal current-voltage characteristics. DC Analysis of BJT circuits, common emitter circuit, BJT biasing. Multistage BJT circuits. BJT as a switch. 7. The Bipolar Linear Amplifier: Small-signal equivalent circuit. Basic Transistor Amplifier Configurations: Common-emitter, common-collector, common-base and amplifiers, cascade cand cascode configurations. 8. Amplifier Frequency Response: MOSEFT and BJT.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Class lectures. 2. Tutoring. 3. Homework. 4. quizzes 5. Mid-term and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.86
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5, 10	LO # 1-6
	Assignments	8	20% (20)	2, 3, 4, 5, 6, 8, 9, and 10	LO # 1-6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-4
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Semiconductor Materials and Properties: Intrinsic and extrinsic semiconductors, drift and diffusion currents, excess carriers.
Week 2	The pn Junction: Reverse-biased pn Junction, forward-biased pn Junction, ideal current–voltage relationship. Diode DC Analysis: Piecewise linear model. Diode AC Equivalent Circuit: Small-signal equivalent circuit.
Week 3	Diode Circuits: Rectifier circuits, Zener diode circuits, clipper and clamper circuits.
Week 4	Diode Circuits: Multiple-diode circuits, photodiode and LED circuits.
Week 5	MOSFET: Structure, operation modes, ideal and non-ideal current-voltage characteristics.
Week 6	MOSFET DC Circuit Analysis: Common-source circuit.
Week 7	Multistage MOSFET Circuits: Cascade and cascode configurations. Junction Field-Effect Transistor: pn JFET and MESFET operation, current-voltage characteristics, DC analysis.
Week 8	The MOSFET Amplifier: Small-signal equivalent circuit. Basic Transistor Amplifier Configurations: Common-source amplifier.
Week 9	Basic Transistor Amplifier Configurations: Common-drain amplifier and common-gate configuration.
Week 10	Multistage Amplifiers: Cascade and cascode circuits. Basic JFET Amplifiers: Small-signal equivalent circuit.
Week 11	Basic Bipolar Junction Transistor: Structure, operation modes, ideal current-voltage characteristics. DC Analysis of Transistor Circuits: Common emitter circuit.
Week 12	Bipolar Transistor Biasing. Multistage BJT Circuits.
Week 13	The Bipolar Linear Amplifier: Small-signal equivalent circuit. Basic Transistor Amplifier Configurations: Common-emitter amplifiers.

Week 14	Basic Transistor Amplifier Configurations: Common-collector amplifier and common-base amplifier.
Week 15	Multistage Amplifiers: Cascade and cascode configurations. Amplifier Frequency Response: MOSEFT and BJT.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	D. A. Neamen, "Microelectronics: Circuit Analysis and Design". USA: McGraw-Hill, 4th ed., 2010.	Yes
Recommended Texts	A. Sedra and K. C. Smith, ``Microelectronics Circuits". New York, USA: Oxford Univ. Press, 7th ed., 2015.	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	Engineering design /Auto CAD			**Module Delivery**	
Module Type	Basic			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	CoE 123				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		1	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Hanadi A. Jaber		**e-mail**	hanadi.jaber@uobasrah.edu.iq	
Module Leader's Acad. Title		lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**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 introduce students to the basic concepts of computer engineering drawing. AutoCAD software is used to draw engineering designs. The course includes knowledge about AutoCAD tools and their properties for developing different software designs in different applications. After completing this course, students are expected to become proficient in the main topics of Computer Drawing by AutoCAD and have the opportunity to explore current topics in the field. The course introduces the principles of: 1. Introduction to AutoCAD software, explaining the status bar, command line, and drawing area. 2. Introducing the two-dimensional drawing. Explain the drawing commands, line, circle, Arc, ellipse, polygon, polyline, etc. 3. Explaining the modify commands, mirror, array, rotate, fillet/ chamfer. 4. Explaining the concepts of adding text, dimensions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the basic concepts of AutoCAD software. 2. Acquiring new skills in designing computer engineering drawings. 3. Gain a basic understanding of many coordinate systems. 4. Acquiring basic skills in designing various systems. 5. The ability to design 2D and 3D drawings and translate problems into software and application designs. 6. The ability to visualize a design and translate it into appropriate commands to get a solution easily and quickly in solving a problem.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to AutoCAD software. [2 hrs.] 2. 2D drawings, Auxiliary drawing tools [4 hrs.] 3. Drawing commands. [12 hrs.] 4. Modify commands. [12 hrs.] 5. Text and dimensions. [4 hrs.] 6. 3D computer drawings. [10 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports 7. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	53	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (15)	5, 12	LO #1, 2, 5 and 7
	Assignments	3	15% (15)	2, 6, 10	LO # 1, 3, 5 and 6
	Projects / Lab.	1	10% (10)	2,3,5	LO # 1, 4, 6 and 8
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	1.5 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	30% (30)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to AutoCAD software
Week 2	Auxiliary drawing tools, Zoom, drawing limits
Week 3	Coordinate systems and show methods for entering points
Week 4	2D drawing: Draw commends; line, circle, and rectangle
Week 5	Arc, ellipse, polygon, and polyline
Week 6	Modify commands: copy, move, Rotate, Mirror
Week 7	Offset, Fillet, Chamfer
Week 8	Break, Trim and extend

Week 9	Array commands; polar and rectangular array
Week 10	Add text and dimension on the design
Week 11	Inserted Dimensions; linear and aligned
Week 12	Add leader dimension and Hatch
Week 13	3D drawings; UCS, Box, Cylinder
Week 14	Draw Sphere, Cone, wedge
Week 15	Extrude, Revolve, subtract, union , slice, and section
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	AutoCAD 2014 Fundamentals	No
Recommended Texts	AutoCAD 2021 Tutorial First Level 2D Fundamentals	No
Websites	websites. Solved examples in AutoCAD. Libraries sites in international universities.	

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	Calculus II			**Module Delivery**	
Module Type	Base			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE121				
ECTS Credits	07				
SWL (hr/sem)	175				
Module Level		1	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Wasan A. Wali		**e-mail**	Wasan.wali@@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE111	**Semester**	1
Co-requisites module	CoE211	**Semester**	3

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Calculus II demands familiarity with mathematical concepts from Calculus I: integration, differentiation, limits, integrals, trigonometric properties, the fundamental theorem of calculus, and graphing techniques. The goal of the semester is to improve students' problem-solving abilities through examples and problems covered in lectures, problem sets, exams, and quizzes. The semester expounds and focuses on the topics: Coordinates, determinants, matrices, multiple Integrals, and functions of two or more variables. The students apply basic concepts and more difficult problems to develop students critical thinking skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Illustrate the extended principle in Calculus II from Calculus I. 2- Improve the ability to analyze and problem-solving approach. 3- Gain the required mathematical skills to solve different problems. 4- Cognitive development of the student by improving his/her learning through adopting a deep learning approach (focusing and understanding). 5- Improve the essential skills to treat with different mathematical problems. 6- Help students grasp the development of knowledge as a process. 7- Improve the writing of scientific reports. 8- Gain the required experience to deal with real-time and industrial systems applications mathematically.
Indicative Contents **المحتويات الإرشادية**	**Course Topics:** **1- Coordinates:** • Polar coordinates: areas and lengths in polar coordinates. **(4hrs)** • Equivalent points and equivalent equations. **(4hrs)** • The relation between the Cartesian and the polar systems, areas, other applications. **(4hrs)** • Three-dimensional coordinates: Cartesian, cylindrical, and spherical. **(4hrs)** **2- Determinants and Matrices:** • Matrix basics add and subtract matrices, multiply a matrix by a scalar. **(4hrs)** • Multiply matrices, and take the transpose of a matrix, special types of matrices, matrix properties. **(4hrs)** • Some properties of determinants, system of linear equations, Gramer's rule, matrices, some and product of matrices. **(4hrs)** • Inverse of matrix, solution of linear equations by matrices. **(4hrs)** **3- Multiple Integrals:** • Double integrals over rectangles, double integrals over general regions. **(4hrs)** • Double integrals in polar coordinates. **(4hrs)** • Applications of double integrals. **(4hrs)**

	• Triple integrals, triple integrals in cylindrical coordinates, triple integrals in spherical coordinates, change of variables in multiple integrals. **(4hrs)** **4- Functions of two or more variables:** • Partial differentiation. **(4hrs)** • Total differential. **(4hrs)** • Multiple integrals. **(4hrs)**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification using the class lectures. 2- Tutorials hours. 3- Reading and self-learning. 4- Home Works. 5- Discussions and workshops 6- Reports. 7- Presentation. 8- Short tests (quizzes). 9- Training and activities during lecture. 10- Mid-terms and final exams. 11- Encourage the student to: • Fully present in class. • Asking the questions that help to understand the material better. • Interaction during lectures • Practicing the examples, homework, and problems.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	113	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	6, 10	LO #1, 2, 4 and 6
	Assignments	3	15% (15)	3, 12	LO #2, 3, 4,5 and 6
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	14	LO # 4, 5,7 and 8
Summative assessment	Midterm Exam	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Coordinates: Polar coordinates areas and lengths in polar coordinates.
Week 2	Coordinates: Equivalent points and equivalent equations.
Week 3	Coordinates: The relation between the Cartesian and the polar systems, areas, other applications.
Week 4	Coordinates: Three-dimensional coordinates: Cartesian, cylindrical, and spherical.
Week 5	Determinants and Matrices: Matrix basics add and subtract matrices, multiply a matrix by a scalar.
Week 6	Determinants and Matrices: Multiply matrices, and take the transpose of a matrix, special types of matrices, matrix properties.
Week 7	Determinants and Matrices: Some properties of determinants, system of linear equations, Gramer's rule, matrices, some and product of matrices.
Week 8	Determinants and Matrices: Inverse of matrix, solution of linear equations by matrices.
Week 9	Multiple Integrals: Double integrals over rectangles, double integrals over general regions.
Week 10	Multiple Integrals: Double integrals in polar coordinates.
Week 11	Multiple Integrals: Applications of double integrals
Week 12	Triple integrals, triple integrals in cylindrical coordinates, triple integrals in spherical coordinates, change of variables in multiple integrals.
Week 13	Functions of two or more variables: Partial differentiation.
Week 14	Functions of two or more variables: Total differential.
Week 15	Functions of two or more variables: Multiple integrals.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus, By Anton Bivens Davis, 2002 Anton Textbooks, Inc	Yes
Recommended Texts	Advanced Engineering Mathematics, By Erwin Kreyszig, 1999, John Wiley & Sons, Inc	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	English Language II			**Module Delivery**	
Module Type	Support or related learning activity			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE126				
ECTS Credits	3				
SWL (hr/sem)	32				
Module Level		2	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Sarah Aziz Al-Hilfi		**e-mail**	sara.aziz@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE116	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The main aim of this module is to enable the student to communicate effectively and appropriately in real life situation using the English Language. Also, pronounce English Correctly and intelligibly. The module presents the following principles that related to both listening and speaking skills: 1. The ability to understand English when it is spoken. 2. Understanding the meaning of words, phrases, and sentences in context. 3. Understanding statements, questions, instructions, and commands. 4. Following simple narratives and descriptions, also grasp the substance and central idea of what is heard. 5. Speak intelligibly while making statements, asking question, giving instructions and commands, reporting events. 6. Put ideas in proper sequence. 7. Describe accurately what he/she observes and experiences .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.Make meaning by organizing language and using appropriate grammatical patterns. 2.Students will learn how to orally present information in a coherent and logical manner. 3.Students will learn useful expressions to be used in presentations. 4.Students will learn how to respond to questions and enquires. 5. Recognize real life spoken English
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Grammars. [10 hrs] 2. Speaking. [6 hrs] 3. Listening. [10 hrs] 4. Pronunciation . [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.87
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Greetings and Farewell
Week 2	Conjunctions in English
Week 3	Articles in English
Week 4	Singular and Plural nouns
Week 5	Countable and Uncountable nouns
Week 6	Pronouns Part I
Week 7	Pronouns Part II
Week 8	Four Conditionals Part I
Week 9	Four Conditionals Part II
Week 10	Speaking Skills
Week 11	Self-introducing

Week 12	Pronunciation
Week 13	Vocabulary Development: formal and informal vocabulary
Week 14	Listening and Making notes Part I
Week 15	Listening and Making notes Part II
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Headway Academic Skills	Yes
Recommended Texts	All versions of Headway	Yes
Websites	British Council, Learn English online	

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	Digital Logic Circuits			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE122				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Dr. Atheel K. Abdulzahraa		**e-mail**	atheel.abdulzahraa@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE114	**Semester**	1
Co-requisites module	CoE214	**Semester**	3

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Analyze and design the combinational logic circuits like (adder circuits, subtractor circuits, comparator circuits, multiplexer, and etc.). 2. Analyze and implement the sequential logic circuits (Latches and Flip - Flops). 3. Analyze and design a different types of register circuits (shift register). 4. Analyze and design the counter circuits (synchronous counters and asynchronous counters).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the combinational logic circuits like (adder circuits, subtractor circuits, comparator circuits, multiplexer, and etc.). 2. Identify the design combinational logic circuits like (adder circuits, subtractor circuits, comparator circuits, multiplexer, and etc.). 3. Identify the design of sequential logic circuits (Latches and Flip - Flops). 4. Identify the design of shift register circuit. 5. Identify the design of counter circuits (synchronous counters and asynchronous counters).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: (Theoretical and Tutorial Hours) 1. Knowledge the adder circuits, subtractor circuits and their design. [4 hrs] 2. Knowledge the comparator circuits and their design. [2 hrs] 3. Knowledge the multiplexer and de multiplexer circuits and their design. [6 hrs] 4. Knowledge the decoder and encoder circuits and their design. [3 hrs] 5. Discussion. [3 hrs] 6. Knowledge the sequential logic circuits and latches. [3 hrs] 7. Knowledge the design of different types of flip – flops. [3 hrs] 8. Knowledge the different types of register and shift register. [6 hrs] 9. Knowledge the design of synchronous counter circuits. [6 hrs] 10. Knowledge the design of asynchronous counter circuits. [3 hrs] 11. Knowledge the design of sequence generator and the sequence count. [3 hrs] 12. Discussion. [3 hrs] Part B: (Lab Hours) 1. Introduction to the Basic Logic gates (AND, OR, NOT, XOR and XNOR GATES). [2 hrs] 2. Introduction to the other Logic gates (NAND, NOR GATES). [2 hrs] 3. Introduction to the design of logic circuit using Boolean Algebra. [2 hrs] 4. Introduction to the design of logic circuit using Karnough Maps. [4 hrs] 5. Introduction to the design of Adder circuits. [2 hrs] 6. Introduction to the design of Subtractor circuits. [2 hrs] 7. Introduction to the design of Comparator circuits. [2 hrs] 8. Discussion and repairing for Mid Exam. [2 hrs] 9. Introduction to the design of Multiplexer circuits. [2 hrs]

	10. Introduction to the design of Multiplexer and De Multiplexer circuits. [2 hrs] 11. Introduction to the design of Decoder and Encoder circuits. [2 hrs] 12. Introduction to the design of Flip – Flops. [2 hrs] 13. Introduction to the design of synchronous and asynchronous counters. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Projects / Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Binary Adder–Subtractor [Half and Full adders, Half and Full subtractors].
Week 2	Comparator circuits.
Week 3	Multiplexer.
Week 4	Multiplexer & Demultiplexer.
Week 5	Decoder & Encoders.
Week 6	Sequential Circuits.
Week 7	Mid-term Exam + Discussion.
Week 8	Flip – Flops.
Week 9	Latches.
Week 10	Discussion.
Week 11	Shift Registers.
Week 12	Synchronous Counters.
Week 13	Asynchronous Counters.
Week 14	Sequence Generator.
Week 15	Discussion.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to the Basic Logic gates (AND, OR, NOT, XOR and XNOR GATES)
Week 2	Introduction to the other Logic gates (NAND, NOR GATES).
Week 3	Introduction to the design of logic circuit using Boolean Algebra.
Week 4	Introduction to the design of logic circuit using Karnough Maps.
Week 5	Introduction to the design of Adder circuits.
Week 6	Introduction to the design of Subtractor circuits.
Week 7	Introduction to the design of Comparator circuits.

Week 8	Introduction to the design of Multiplexer circuits.
Week 9	Introduction to the design of Multiplexer and De Multiplexer circuits.
Week 10	Introduction to the design of Decoder and Encoder circuits.
Week 11	Introduction to the design of Flip – Flops.
Week 12	Introduction to the design of synchronous and asynchronous counters.
Week 13	Continuous to Introduction to the design of synchronous and asynchronous counters.
Week 14	Mixed of experiments of previous topics.
Week 15	Mixed of experiments of previous topics.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Fundamentals of logic design. Cengage Learning by Roth Jr, Charles H., Larry L. Kinney, and Eugene B. John.	Yes
Recommended Texts	Digital computer fundamentals. McGraw-Hill, Inc, by Bartee, Thomas C.	Yes
Websites	https://www.coursera.org/lecture/build-a-computer/unit-1-3-logic-gates-Aqrh6	

Grading Scheme
مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Object Oriented Programming			**Module Delivery**	
Module Type	Core			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	CoE123				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Computer Engineering		**College**	Collage of Enginnering	
Module Leader	Dhayaa R. Khudher		**e-mail**	dhayaa.khudher@uobasrah.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE113	**Semester**	1
Co-requisites module	CoE224	**Semester**	4

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The Object-Oriented Programming (OOP) module aims to introduce students to the fundamental concepts and principles of object-oriented programming and enable them to apply these concepts in software development. The specific aims of the module may include: 1. Understanding OOP Principles: The module aims to provide a solid understanding of the core principles of object-oriented programming, such as encapsulation, inheritance, polymorphism, and abstraction. Students will learn how these principles contribute to code organization, reusability, and maintainability. 2. Applying OOP Concepts: The module aims to develop students' ability to apply OOP concepts in practical programming scenarios. Students will learn how to define classes, create objects, and use inheritance and polymorphism to model and solve real-world problems. 3. Designing and Implementing Classes: The module aims to enhance students' skills in designing and implementing classes effectively. Students will learn how to define class attributes and methods, manage access levels, and establish relationships between classes. 4. Implementing Inheritance and Polymorphism: The module aims to enable students to understand and utilize inheritance and polymorphism effectively. Students will learn how to create class hierarchies, derive subclasses from base classes, and override methods to achieve specialized behavior. 5. Managing Object State: The module aims to equip students with techniques for managing object state using instance variables and methods. Students will learn how to ensure data integrity, apply access modifiers, and implement appropriate getter and setter methods. 6. Utilizing Design Patterns: The module aims to introduce students to common design patterns and their application in OOP. Students will learn about design patterns such as the Singleton pattern, Factory pattern, and Observer pattern, and how they can be used to solve recurring design problems. 7. Debugging and Troubleshooting OOP Code: The module aims to develop students' skills in debugging and troubleshooting object-oriented code. Students will learn techniques for identifying and fixing errors, handling exceptions, and ensuring the correctness of their OOP implementations. 8. Applying OOP in Software Development: The module aims to provide students with practical experience in applying OOP principles and techniques in software development projects. Students will work on OOP-based projects,

	applying concepts such as inheritance, polymorphism, and encapsulation to design and implement robust and scalable software solutions. 9. Understanding OOP Best Practices: The module aims to familiarize students with industry best practices and coding standards in object-oriented programming. Students will learn about topics such as code organization, naming conventions, documentation, and code reusability, to develop clean and maintainable code. Overall, the Object-Oriented Programming module aims to equip students with a solid foundation in object-oriented programming concepts, enabling them to design and implement efficient, modular, and scalable software solutions using OOP principles
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The Object-Oriented Programming (OOP) module is designed to achieve specific learning outcomes that demonstrate students' proficiency in the subject matter. The module learning outcomes may include: 1. Knowledge and Understanding: Students will acquire a solid understanding of the fundamental concepts, principles, and techniques of object-oriented programming. They will demonstrate knowledge of topics such as encapsulation, inheritance, polymorphism, and abstraction. 2. Application of OOP Concepts: Students will be able to apply object-oriented programming concepts and techniques to design and implement software solutions. They will demonstrate proficiency in creating classes, defining attributes and methods, managing object relationships, and utilizing inheritance and polymorphism effectively. 3. Design and Implementation Skills: Students will develop skills in designing and implementing object-oriented solutions to real-world problems. They will be able to design class hierarchies, implement encapsulation and information hiding, and create reusable and maintainable code structures. 4. Problem-Solving and Analytical Skills: Students will enhance their problem-solving and analytical abilities by applying object-oriented principles to analyze, design, and implement software solutions. They will demonstrate the ability to break down complex problems into manageable components and utilize appropriate OOP techniques to solve them. 5. Debugging and Troubleshooting: Students will develop proficiency in debugging and troubleshooting object-oriented code. They will demonstrate the ability to identify and fix errors, handle exceptions, and ensure the correctness of their OOP implementations. 6. Collaboration and Communication: Students will learn to collaborate effectively in team-based software development projects. They will demonstrate the ability to communicate and discuss OOP concepts, share code, and work together to solve programming challenges. 7. OOP Best Practices: Students will understand and apply best practices in

	object-oriented programming. They will demonstrate knowledge of coding standards, code organization, documentation, and code reusability to develop clean, readable, and maintainable code. 8. Critical Thinking and Evaluation: Students will develop critical thinking skills in evaluating different design choices and making informed decisions in object-oriented programming. They will demonstrate the ability to analyze trade-offs and make design decisions based on factors such as performance, maintainability, and extensibility. 9. Lifelong Learning: Students will develop a passion for lifelong learning and professional development in the field of object-oriented programming. They will demonstrate the ability to stay updated with emerging trends and technologies, explore advanced OOP concepts, and adapt to evolving programming paradigms. By achieving these learning outcomes, students will have a strong foundation in object-oriented programming principles and be prepared to apply their knowledge and skills in practical software development contexts.
Indicative Contents المحتويات الإرشادية	The indicative contents for the Object-Oriented Programming (OOP) module may include the following topics: 1. Introduction to Object-Oriented Programming: • Overview of programming paradigms • Benefits and principles of OOP • Objects, classes, and their relationships • Encapsulation, inheritance, and polymorphism 2. Classes and Objects: • Class definition and structure • Attributes and methods • Constructors and destructors • Access modifiers (public, private, protected) • Static and instance variables/methods 3. Inheritance and Polymorphism: • Inheritance hierarchy and relationships • Single and multiple inheritance • Method overriding and overloading • Abstract classes and interfaces • Polymorphism and dynamic binding 4. Object-Oriented Analysis and Design: • UML (Unified Modeling Language) basics • Use case diagrams, class diagrams, and sequence diagrams • Object-oriented design principles (SOLID)

	• Design patterns and their application 5. Exception Handling: • Exception types and handling mechanisms • try-catch blocks • Throwing and propagating exceptions • Custom exception classes 6. Collections and Generics: • Overview of collection frameworks • Lists, sets, and maps • Iterators and foreach loops • Generics and type safety 7. File Handling and Input/Output Operations: • Reading and writing data from/to files • Streams and file handling classes • Serialization and deserialization 8. Event-driven Programming: • Introduction to event-driven programming • Event handlers and listeners • GUI (Graphical User Interface) development using OOP 9. Software Development Principles: • Code organization and modularization • Documentation and comments • Version control and collaborative development (e.g., Git) • Testing and debugging techniques 10. Advanced OOP Concepts: • Nested classes and inner classes • Reflection and introspection • Designing for reusability and maintainability • Advanced topics such as generics, lambdas, and streams (language-dependent) These indicative contents provide a comprehensive coverage of essential topics in object-oriented programming.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Object-oriented programming (OOP) is a programming paradigm that organizes code into objects, which are instances of classes that encapsulate data and behavior. OOP provides several strategies and principles that help in designing and implementing

	effective and maintainable software solutions. Here are some commonly used strategies in object-oriented programming: 1. Encapsulation: Encapsulation is the practice of bundling data and methods together within a class. It hides the internal details of an object and provides a clean interface to interact with it. Encapsulation promotes information hiding and helps maintain the integrity of the object's data. 2. Inheritance: Inheritance allows you to create new classes based on existing classes, inheriting their attributes and behaviors. It promotes code reuse, as common attributes and methods can be defined in a base class and shared among derived classes. Inheritance supports the "is-a" relationship between classes, where a derived class is a specialized version of the base class. 3. Polymorphism: Polymorphism allows objects of different classes to be treated as instances of a common base class. It enables the use of the same interface for different objects, providing flexibility and extensibility. Polymorphism is often achieved through method overriding and method overloading. 4. Abstraction: Abstraction focuses on defining essential properties and behaviors while hiding unnecessary details. It simplifies complex systems by providing a high-level view and reducing complexity. Abstract classes and interfaces are used to define common behavior and serve as blueprints for concrete classes. 5. Composition: Composition involves building complex objects by combining simpler objects. It emphasizes the "has-a" relationship between classes. Instead of inheriting behavior, an object is composed of other objects as components or parts. This approach offers flexibility, as components can be easily added, removed, or replaced. 6. Association: Association represents a relationship between two or more classes. It can be a one-to-one, one-to-many, or many-to-many relationship. Associations are established through instance variables, and they define how objects interact and communicate with each other. 7. SOLID principles: SOLID is an acronym for a set of five principles that guide software design in OOP. These principles are Single Responsibility Principle (SRP), Open-Closed Principle (OCP), Liskov Substitution Principle (LSP), Interface Segregation Principle (ISP), and Dependency Inversion Principle (DIP). Adhering to these principles helps create modular, maintainable, and extensible code. These strategies and principles provide a foundation for designing and implementing object-oriented systems. They promote code reusability, modularity, maintainability, and flexibility, enabling developers to build robust and scalable software solutions

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to OOP principles and concepts.
Week 2	Overview of class, object, and method.
Week 3	Implementing a simple class in a programming language.
Week 4	Encapsulation and data hiding.
Week 5	Access modifiers (public, private, protected).
Week 6	Inheritance and the "is-a" relationship.
Week 7	Base classes and derived classes.
Week 8	Method overriding and inheritance hierarchy.

Week 9	Polymorphism and the "one interface, multiple implementations" concept.
Week 10	Method overloading and overriding.
Week 11	Using abstract classes and interfaces.
Week 12	Composition and the "has-a" relationship.
Week 13	Building complex objects using composition
Week 14	Comparing composition with inheritance.
Week 15	Exception handling in OOP.
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Class, object, and method.
Week 2	Implementing a simple class in a programming language.
Week 3	Constructors and destructors
Week 4	Encapsulation and data hiding.
Week 5	Access modifiers (public, private, protected).
Week 6	Inheritance and the "is-a" relationship.
Week 7	Base classes and derived classes.
Week 8	Method overriding and inheritance hierarchy.
Week 9	Polymorphism and the "one interface, multiple implementations" concept.
Week 10	Method overloading and overriding.
Week 11	Using abstract classes and interfaces.
Week 12	Composition and the "has-a" relationship.
Week 13	Building complex objects using composition
Week 14	Comparing composition with inheritance.
Week 15	Exception handling in OOP.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	C++ Primer, 5th Edition by Stanley B. Lippman, Josée Lajoie, Barbara E. Moo	Yes
Recommended Texts	C++ Programming: From Problem Analysis to Program Design. Fifth Edition. D.S Malik	No
Websites	1. https://www.geeksforgeeks.org/ 2. https://github.com/ 3. https://www.khanacademy.org/ 4. https://www.codecademy.com/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electrical Circuits 2			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE215				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Computer Engineering		**College**	Collage of Engineering	
Module Leader	Ali Mohammed Ahmed		**e-mail**	ali.ahmed@uobasrah.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE112	**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. Understanding AC power concepts and terminologies. 2. Familiarity with the various types of resonant circuits and their applications. 3. Analysis of first and second order transient circuits. 4. Understanding the concept of frequency response and transfer functions. 5. Understanding the concept of two port networks and their different parameters. 6. Study of the mutual inductance and magnetically coupled circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge of the key parameters of AC power systems, including power factor, apparent power, real power, and reactive power. 2. Ability to analyze and design resonant circuits for different applications. 3. Understanding of the behavior of circuits under transient conditions, including changes in voltage and current. 4. Knowledge of common types of transients, including critical damping and overshoot/undershoot. 5. Understanding of the behavior of circuits and systems under different frequency conditions. 6. Familiarity with various types of filters, such as low-pass, high-pass, band-pass filter, and their unique characteristics and applications. 7. Ability to analyze and design complex circuits and systems using two-port network theory. 8. Understanding of the behavior of two-port networks under different conditions, including changes in input and output parameters such as voltage, current, and impedance.
Indicative Contents المحتويات الإرشادية	<u>Part A: (Theoretical and Tutorial Hours)</u> 1. Introduction to AC power analysis, instantaneous and average power [2 hours] 2. Maximum average power, apparent power, and power factor [4 hours] 3. Complex power and power factor correction [4 hours] 4. Series and parallel resonant circuits, quality factor and selectivity [4 hours] 5. Introduction to the transient, the concept of natural and forced responses + the source-free RC circuits [2 hours] 6. The source-free RL circuits [2 hours] 7. Driven RC and RL circuits [4 hours] 8. Second order transient circuits: the source-free parallel RLC circuits [2 hours] 9. The overdamped, critically damped, and underdamped parallel RLC circuits [4 hours] 10. The source-free series RLC circuits: overdamped, critically damped, and underdamped [2 hours] 11. Driven RLC circuits and their complete response [4 hours]

	12. Frequency response, transfer functions, and bode diagrams [4 hours] 13. Basic filter design (LPF, HPF, and BPF) [4 hours] 14. Two port networks: introduction and impedance parameters [2 hours] 15. Admittance parameters, hybrid parameters, and transmission parameters [4 hours] 16. Interconnection of networks [2 hours] 17. Magnetically coupled circuits: introduction and mutual inductance [4 hours] 18. Energy in a coupled circuit [2 hours] 19. Linear and ideal transformers [4 hours] <u>Part B: (Lab Hours)</u> 1. The Oscilloscope and the Function Generator [4 hours] 2. RL and RC circuits [4 hours] 3. RLC series and parallel circuits [2 hours] 4. Resonance in Series RLC Circuits [4 hours] 5. Resonance in Parallel RLC Circuits [4 hours] 6. Transient Response of an RC Circuit [4 hours] 7. Transient Response of RLC Circuits [4 hours] 8. Two port networks [2 hours]

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	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 9
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	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	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	AC Power: instantaneous and average power
Week 2	Maximum average power, apparent power, and power factor
Week 3	Complex power and power factor correction
Week 4	Series and parallel resonant circuits, quality factor and selectivity
Week 5	Concept of natural and forced responses + the source-free RC circuits + The source-free RL circuits
Week 6	Driven RC and RL circuits
Week 7	Mid-term exam + The source-free parallel RLC circuits
Week 8	The overdamped, critically damped, and underdamped parallel and series RLC circuits
Week 9	Frequency response, transfer functions, and bode diagrams
Week 10	Basic filter design (LPF, HPF, and BPF)

Week 11	Two port networks
Week 12	Interconnection of networks
Week 13	Magnetically coupled circuits
Week 14	Energy in a coupled circuit
Week 15	Linear and ideal transformers
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: The Oscilloscope and the Function Generator
Week 2	Lab 2: The Oscilloscope and the Function Generator (continued)
Week 3	Lab 3: RL and RC circuits
Week 4	Lab 4: RL and RC circuits (continued)
Week 5	Lab 5: RLC series and parallel circuits
Week 6	Lab 6: Resonance in Series RLC Circuits
Week 7	Lab 7: Resonance in Series RLC Circuits (continued)
Week 8	Lab 8: Resonance in Parallel RLC Circuits
Week 9	Lab 9: Resonance in Parallel RLC Circuits (continued)
Week 10	Lab 10: Transient Response of an RC Circuit
Week 11	Lab 11: Transient Response of an RC Circuit (continued)
Week 12	Lab 12: Transient Response of RLC Circuits
Week 13	Lab 13: Transient Response of RLC Circuits (continued)
Week 14	Lab 14: Two port networks
Week 15	Lab 15: Two port networks (continued)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes

Recommended Texts	Engineering Circuit Analysis, W. Hayt and J. Kemmerly	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	Calculus III			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE212				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Heba Hakim		**e-mail**	hiba.abdulzahrah@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE121	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of mathematics and their use for problem solving and systems design in engineering. This mathematics course covers vector calculus, sequences and series, Laplace transform and partial differentiation it depends on the main topics of Math I and Math II courses. It can be as an introduction to study the topics of engineering analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the module, students should be able to: 1. Solve mathematical problems using reasonably advanced mathematical techniques such implicit differentiation, and Maclaurin Taylor series expansions. 2. Understand convergence of sequences and series and be able to test for convergence. 3. Understand and appreciate the importance of power series and Taylor polynomials 4. Use graphical information and symbolic expression simultaneously in solving mathematical problems. 5. Translate ordinary language descriptions of problems into mathematical expression, derive solutions by mathematical methods, interpret their results, and explain them. 6. Understand how to express logical quantitative arguments and think logically
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Sequences and series. 2. Vector Analysis. 3. Laplace Transform 4. Partial Differentiation.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	88	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
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**
Formative assessment	**Quizzes**	3	10% (15)	4,7,12	LO #1, 2, 5,7 and 10
	Assignments	3	15% (10)	2, 6, 10	LO # 1, 3, 5, 6 and 9
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 4, 5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Sequences and subsequences, limits, uniqueness of limits.
Week 2	Series convergence and divergence: comparison test, comparison of ratios, integral test, test of alternating series, absolute and conditional convergence.
Week 3	infinite series test for convergence, power series for functions, Taylor's theorem, Mclaurian series
Week 4	convergence of power series, differentiation and integration
Week 5	solution of differential equations by series, Legender and Bessel equations.
Week 6	scalars and vectors, components of a vector, addition of vectors, multiplication by scalars, vector in space, dot product, cross product, forms of equation of a curve in space
Week 7	parametric representation, tangential and normal, vectors, curvature, radius of curvature, forms of equation of a surface in space,

Week 8	gradient and normal vectors, vector function in Cartesian cylindrical and spherical coordinates,
Week 9	speed, and acceleration, line, surface, and volume integrals and Divergence theorem.
Week 10	Functions of two or more variables, tangent plane and normal line, the directional derivative, the gradient, the chain rule for partial derivatives, the total differential,
Week 11	Maximum and minimum of two independent variables.
Week 12	Laplace Transform: transforms and properties.
Week 13	inverse transform, partial fraction, application
Week 14	DE solutions using Laplace transform.
Week 15	Different topics
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas, "Calculus and Analytic Geometry".	Yes
Recommended Texts	Kreyszig, "Advanced Engineering Mathematics".	Yes
Websites	websites. Libraries sites in international universities.	

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	Digital System Design			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE214				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		2	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Dunia Sattar Tahir		**e-mail**	Dunia.tahir@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE122	**Semester**	2
Co-requisites module	CoE214	**Semester**	4

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this course is to teach students how to analyze, design and implement digital systems using powerful techniques and tools, such as Programmable Logic Devices and Finite State Machines (FSMs).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the complex digital systems such as memory and programable logic devices. 2. Analysis digital systems using various technologies. 3. Design digital systems using combinational and sequential logic circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: (Theoretical and Tutorial Hours) 1. Memory and Programmable Logic Devices – Design ROM. [2 hrs] 2. Memory and Programmable Logic Devices – Design PLA and PAL. [6 hrs] 3. Memory and Programmable Logic Devices – Design FPGA. [4 hrs] 4. Analysis sequential circuits. [12 hrs] 5. Design sequential circuits. [16 hrs] 6. Reduction techniques of sequential circuits. [8 hrs] 7. Design digital systems using ASM chart. [8 hrs] 8. Detection hazards and design free hazards logic circuits. [4 hrs] Part B: (Lab Hours) 1. Introduction to Altera Quartus II Software Design. [4 hrs] 2. Implementation combinational logic circuits using VHDL. [12 hrs] 3. Implementation sequential logic circuits using VHDL. [12 hrs] 4. Implementation of combinational logic circuits using structural model. [2 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3, 7, 12	LO #1, 2, 3, 4, 6, 7 , 8 and 10
	Assignments	2	10% (10)	3, 7, 10, 13	LO # 2, 3, 5, 8 and 11
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,9, 11 and 12
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Memory and Programmable Logic Devices – Design ROM, PLA and PAL- I.
Week 2	Memory and Programmable Logic Devices – Design ROM, PLA and PAL- II.
Week 3	Memory and Programmable Logic Devices – Design FPGA.
Week 4	Analysis sequential circuits – I.
Week 5	Analysis sequential circuits – II.
Week 6	Analysis sequential circuits – III.
Week 7	Design of a sequence detector using a Mealy machine.
Week 8	Design of a sequence detector using a Moore machine.

Week 9	Design finite state machines Using ROMs, PLDs and FPGAs.
Week 10	Design finite state machines using one-hot state assignment.
Week 11	Reduction techniques of sequential circuits – I.
Week 12	Reduction techniques of sequential circuits – II.
Week 13	Principal component of an Algorithmic State Machine (ASM) chart and conversion of a state graph to an ASM Chart.
Week 14	Design digital systems using ASM chart.
Week 15	Detection of hazards in logic circuits and design free hazards logic circuits.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Altera Quartus II Software Design - I.
Week 2	Lab 2: Introduction to Altera Quartus II Software Design - II.
Week 3	Lab 3: Implementation of all logic gates using VHDL.
Week 4	Lab 4: Implementation of arithmetic logic circuits using VHDL.
Week 5	Lab 5: Implementation of Multiplexer/ demultiplexer using VHDL.
Week 6	Lab 6: Implementation of Decoder/ encoder using VHDL.
Week 7	Lab 7: Implementation of ROM using VHDL.
Week 8	Lab 8: Implementation of PLA and PAL using VHDL.
Week 9	Lab 9: Implementation of Flip-Flops using VHDL - I.
Week 10	Lab 10: Implementation of Flip-Flops using VHDL - II.
Week 11	Lab 11: Design counters using VHDL - I.
Week 12	Lab 12: Design counters using VHDL - II.
Week 13	Lab 13: Design registers using VHDL - I.
Week 14	Lab 14: Design registers using VHDL - II.
Week 15	Lab 15: Implementation of combinational logic circuits using structural model.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Logic Design, Charles H. Roth, Jr.	Yes
Recommended Texts	Digital Design, M. Morris Mano	No
Websites	websites. Libraries sites in international universities.	

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	Discrete Structures			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE212				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		2	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Mohammed A. Ali		**e-mail**	mohammed.joudah@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**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 introduce students to this fundamental field of computer science, which enables students to focus on the study of discrete mathematics and structures and their use for problem solving and systems design in science and engineering. The course introduces the principles of: 1. Logic, set theory, relations, functions, number systems, and their operations. 2. Introduces the principles of counting and its basic ways, such as permutations, combinations, and counting methods. 3. Methods of proof and their mathematical laws. 4. To think logically in reasoning and to use rapid methods of counting.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explaining the basic concepts of logical methods in the laws of proof. 2. Acquiring new skills in counting methods. 3. Acquiring fundamental skills in building computational systems. 4. Gaining a basic understanding of system programming and operating systems. 5. The ability to translate issues into program and application designs. 6. The ability to think logically in solving a specific problem. 7. The ability to use fast counting methods. 8. The ability to gain expertise in proof methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Mathematical Logic and Induction. [6 hrs] 2. Set Theory. [6 hrs] 3. Relations. [6 hrs] 4. Functions. [3 hrs] 5. Predicates and Quantifiers. [6 hrs] 6. Integer Representations, Sequences and Summations. [6 hrs] 7. Counting, Permutations, Combinations. [9 hrs] 8. Structural Induction. [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	53	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, 5 and 7
	Assignments	3	15% (10)	2, 6, 10	LO # 1, 3, 5 and 6
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 4, 5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Propositional logic
Week 2	Logical reasoning
Week 3	Basics
Week 4	Set operations
Week 5	Properties, Combining relations
Week 6	Closures, Equivalence, partial ordering
Week 7	One-to-one, onto, inverse, composition, graphs
Week 8	Predicates, preconditions and postconditions
Week 9	Universal Quantifier, Existential Quantifier, Restricted Domains, Using Quantifiers in System Specifications

Week 10	Primes, greatest common divisors, least common multiple, euclidean algorithm
Week 11	Sequences, recurrence relations, summations
Week 12	Product rule, Sum rule, Subtraction Rule, Division Rule, Tree Diagrams, Pigeonhole Principle
Week 13	Permutations
Week 14	Combinations, Binomial Coefficients and Identities, Repetitions
Week 15	Recursively Defined Functions, Sets and Structures, Structural Induction
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals Approach to Discrete Mathematics, D.P Acharjya	Yes
Recommended Texts	Discrete Mathematics and Its Applications, Rosen	Yes
Websites	websites. Libraries sites in international universities.	

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	Signals and Systems			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE213				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		2	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Emad A. Jasim		**e-mail**	emad.abdulrazaq@uobasrah.edu.iq	
Module Leader's Acad. Title		lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE112	**Semester**	1
Co-requisites module	CoE225, CoE315, CoE324	**Semester**	2, 1, 2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of mathematics and mathematical analysis and their use for problem solving and systems design in science and engineering. The module introduces the principles of transforming systems and signals to mathematical equation , set theory, functions and their operations. It also introduces the principles of analyzing the equations into time domain and frequency domain and learning the transformation relations between each other. Also, this module gives the student the knowledge of the easiest way in the analyzing and obtaining the results in optimum way.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarify the basic concepts of mathematical analyzing methods for signals and systems. 2. Gain new skills in transformation methods between the mathematical equations of different variables. 3. Gain basic skills to building computing systems and evaluating the systems to obtain the optimum system as properties and application. 4. Gain basic understanding of system programming and operating. 5. The ability to transform signals and systems into mathematical equations. 6. The ability to choose the optimum way in processing a particular problem. 7. The ability to use fast counting methods. 8. The ability to gain experience in methods of proof.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Signals Classification and Models. [8 hrs] 2. Signal Spectrum. [4 hrs] 3. Frequency Domain. [12 hrs] 4. System Classification and Analysis. [12 hrs] 5. Frequency Domain Analysis and Laplace Transform. [8 hrs] 6. Types of Signals Modulation. [4 hrs] 7. Amplitude Modulation. [4 hrs] 8. Angle Modulation. [8 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes).

	5. Reports. 6. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, 3, 5 and 7
	Assignments	3	15% (10)	2, 6, 10	LO # 1, 2, 3, 4, 5,6 and 7
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 2, 3, 4, 5 6 and 7
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Type of Signals and Signal Operations
Week 2	Some Useful Signal Models
Week 3	Phasors and Frequency Spectrum
Week 4	Fourier Series
Week 5	Fourier Transform
Week 6	Fourier Transform Properties

Week 7	System Types and Description
Week 8	Time Domain Analysis
Week 9	Convolution
Week 10	System Analysis
Week 11	System Analysis
Week 12	Signals Modulation
Week 13	Amplitude Modulation
Week 14	Frequency Modulation
Week 15	Phase Modulation
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Signals-and-Systems - by Oppenheim	Yes
Recommended Texts	Analog and Digital Communication - Schaum	Yes
Websites	websites. Libraries sites in international universities.	

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	Differential Equations			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE222				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Heba Hakim		**e-mail**	hiba.abdulzahrah@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE211	**Semester**	3
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The construction of mathematical models to address real-world problems has been one of the most important aspects of each of the branches of science. It is often the case that these mathematical models are formulated in terms of equations involving functions as well as their derivatives. Such equations are called differential equations. If only one independent variable is involved, often time, the equations are called ordinary differential equations. The course will demonstrate the usefulness of ordinary differential equations for modeling physical and other phenomena. Complementary mathematical approaches for their solution will be presented, including analytical methods, graphical analysis and numerical techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Using the language of mathematics in communicating and expressing life situations. 2. The ability to build mathematical models of engineering structures. 3. The ability to present and discuss mathematical ideas and acquire the skill of mathematical proof. 4. Employs reading and listening skills to explain mathematical ideas and provide convincing justifications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Differential Equations. 2. First-Order Differential Equations. 3. Modeling with First-Order Differential Equations. 4. Higher-Order Differential Equations. 5. Modeling with Higher-Order Differential Equations.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (15)	2, 7, 10	LO #1, 2, 5, 7 and 10
	Assignments	3	15% (10)	2, 6, 10	LO # 1, 3, 5 and 7
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 4, 5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Separation of variables.
Week 2	Homogeneous Differential Equations .Solutions by substitutions.
Week 3	Exact Differential Equations .
Week 4	Linear Differential Equations .
Week 5	2nd order Homogeneous Differential Equations
Week 6	Eular Cauchy 2nd order Homogeneous Differential Equations
Week 7	2nd order Non-Homogeneous Differential Equations
Week 8	Higher order Differential Equations
Week 9	Linear models; exponential growth and decay,

Week 10	Newton's law of cooling, mixture problems, series circuits
Week 11	Non-linear models; logistic growth, chemical reactions. Systems of differential equations; radioactive series, mixtures, predator-prey models,
Week 12	Linear models with initial value problems; spring/mass systems with free undamped motion,
Week 13	Linear models with initial value problems; spring/mass systems with free damped motion, and driven motion.
Week 14	Series circuit analogue. Linear models with boundary value problems. Nonlinear models.
Week 15	Different topics
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas, "Calculus and Analytic Geometry".	Yes
Recommended Texts	Kreyszig, "Advanced Engineering Mathematics".	Yes
Websites	websites. Libraries sites in international universities.	

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	Microprocessor Programming			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE223				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		2	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Dunia Sattar Tahir		**e-mail**	Dunia.tahir@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE214	**Semester**	3
Co-requisites module	CoE322	**Semester**	6

<table>
<tr><th colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td>The aim of this course is to teach students the basic concepts of microprocessor-based systems, and introduces the assembly language for Intel x86 microprocessor family.</td></tr>
<tr><td>Module Learning Outcomes
مخرجات التعلم للمادة الدراسية</td><td>1. Understand the main components and working principles of the Intel x86 microprocessor family.
2. Program and debug in assembly language.
3. Understand the basic computer architecture.</td></tr>
<tr><td>Indicative Contents
المحتويات الإرشادية</td><td>Indicative content includes the following:
<u>Part A: (Theoretical and Tutorial Hours)</u>
1. Introduction and history of microprocessors. [3 hsr]
2. Microprocessor architecture of Intel x86 microprocessor family. [3 hrs]
3. Memory management of Intel x86 microprocessor family. [3 hrs]
4. Addressing modes of Intel x86 microprocessor family. [3 hrs]
5. Instruction format of Intel x86 microprocessor family. [3 hrs]
6. Assembly language programming. [3 hrs]
7. Instruction set Intel x86 microprocessor family. [27 hsr]

<u>Part B: (Lab Hours)</u>
1. Debug Program. [6 hrs]
2. Addressing modes of Intel x86 microprocessor family. [2 hrs]
3. Instruction set Intel x86 microprocessor family. [22 hrs]
1. Data transfer instructions. [6 hrs]
2. Arithmetic instructions. [4 hrs]
3. Bit manipulation instructions. [4 hrs]
4. Control transfer instructions. [6 hrs]
5. String instructions. [2 hsr]</td></tr>
</table>

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3, 7, 12	LO #1, 2, 3, 4, 6, 7, 8 and 10
	Assignments	2	10% (10)	3, 7, 10, 13	LO # 2, 3, 5, 8 and 11
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,9, 11 and 12
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and history of microprocessors.
Week 2	Microprocessor architecture of Intel *x86* microprocessor family.
Week 3	Memory management of Intel *x86* microprocessor family.

Week 4	Addressing modes of Intel *x86* microprocessor family.
Week 5	Instruction format of Intel *x86* microprocessor family.
Week 6	Assembly language programming.
Week 7	Data transfer instructions.
Week 8	Stack operations.
Week 9	Arithmetic instructions – I.
Week 10	Arithmetic instructions – II.
Week 11	Bit Manipulation instructions.
Week 12	Control transfer instructions – Jump instructions.
Week 13	Control transfer instructions – Loop instructions.
Week 14	Control transfer instructions – Subroutine instructions.
Week 15	String instructions.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Debug Program – Memory management commands.
Week 2	Lab 2: Debug Program – Assembler commands.
Week 3	Lab 3: Lab 2: Debug Program – Program control commands.
Week 4	Lab 4: Addressing modes of Intel x_{86} microprocessor family.
Week 5	Lab 5: Data transfer Instructions.
Week 6	Lab 6: Stack instructions.
Week 7	Lab 7: Input and output instructions.
Week 8	Lab 8: Addition and subtraction instructions.
Week 9	Lab 9: Multiplication and division instructions.
Week 10	Lab 10: Logical instructions.
Week 11	Lab 11: Shift and rotate instructions.
Week 12	Lab 12: Control transfer instructions - Jump instructions.
Week 13	Lab 13: Control transfer instructions - Loop instructions.
Week 14	Lab 14: Control transfer instructions – Call and ret instructions.
Week 15	Lab 15: String instructions.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	The 8088 and 8086 microprocessors Programming, Interfacing, Software, Hardware, and Applications, Fourth Edition, Walter A. Triebel and Avtar Singh	Yes
Recommended Texts	The intel microprocessors, Eighth Edition, BARRY B. BREY.	No
Websites	websites. Libraries sites in international universities.	

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	Algorithms			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE224				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		2	**Semester of Delivery**		4
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Musaab A. Alaziz		**e-mail**	mosab.adil@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE123	**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	This course aims to introduce students to this fundamental field of computer science and computer engineering, which enables students to focus on the study of data structures and programming background and make them expert in programming the common algorithms and data structures with full understanding to the complexity of each algorithm, using the JAVA and C++ programming languages. Most searching, sorting, and graph algorithms are covered in this course. The students will perform laboratory exercises in programming the commonplace algorithms in C++. The students will also be exposed to computation models and computational complexity.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarify the basic concepts of data structures 2. Gain new skills in finding the growing and the complexity of functions. 3. Gain the skills to compute the complexity of the programming code. 4. Understanding searching and sorting algorithms. 5. Understanding simple table problems with modern solutions. 6. Gain basic understanding in Graph algorithms.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: (Theoretical and Tutorial Hours) 1. **Introduction**. [6 hrs] 2. **Algorithmic analysis**. [6 hrs] 3. **Art of Algorithms**. [3 hrs] 4. **Data Structure**. [3 hrs] 5. **Sorting algorithms**. [9 hrs] 6. **Symbol Tables**. [3 hrs] 7. **Binary Search Tree**. [6 hrs] 8. **Hash Tables**. [3 hrs] 9. **Undirected Graph**. [6 hrs] Part B: (Lab Hours) 1. Introduction, Data structure [2 hrs] 2. Greedy Algorithms and searching algorithms. [6 hrs] 3. Binary search tree. [2 hrs] 4. Sorting. [12 hrs] 5. Tree structure with their algorithms. [4 hrs] 6. Mixed of experiments of previous topics. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction** - Basic algorithms, algorithm using
Week 2	**Introduction** - complexity, the purpose and role of algorithms in computer engineering.
Week 3	**Algorithmic analysis** - behavior (best, average, and worst case), Big "O," little "o," omega, and theta notation, measurements
Week 4	**Algorithmic analysis** - Time and space tradeoffs, recursive algorithms. Distributed algorithms Concurrency and Scheduling.
Week 5	**Art of Algorithms -** Dynamic connectivity, quick find, quick union, improvements
Week 6	**Data Structure** - Trees, graphs, Binary tree, and Binary search tree.
Week 7	**Sorting** - Selection, Insertion, Bubble, and Shell sort
Week 8	**Sorting -** Merge sort, Quick sort, duplicate keys, system sorts
Week 9	**Sorting -** Binary heap, and heap sort
Week 10	**Symbol Tables -** API, sequential search, binary search, ordered operations.
Week 11	**Binary Search Trees -** BST, ordered operations, deletion
Week 12	**Binary Search Trees -** 2-3 Search trees, red-black BSTs
Week 13	**Hash Tables -** Hash functions, sperate chaining, linear probing
Week 14	**Undirected Graph -** DFS, BFS, connected components.
Week 15	**Undirected Graph -** Searching, topological sorting, MST, and Shortest path algorithms
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Data structure – linked list, stack, queue
Week 2	Lab 2: Linear search, find the max
Week 3	Lab 3: Binary Search, Greedy Algorithm
Week 4	Lab 4: 3-sum (and its improved way)
Week 5	Lab5: Binary tree
Week 6	Lab 6: Quick find, Quick union, Weighted Quick-Union
Week 7	Lab 7: Selection and insertion sort
Week 8	Lab 8 : Bubble and Shell sort
Week 9	Lab 9: Merge sort

Week 10	Lab 10: Midterm exam
Week 11	Lab 11: Quick sort
Week 12	Lab 12: Heap sort
Week 13	Lab 13: Binary Search tree, 2-3 tree, and red black tree
Week 14	Lab 14: Mixed of experiments of previous topics.
Week 15	Lab 15: Mixed of experiments of previous topics.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Algorithms 4th edition by R. Sedgewick and K. Wayne, Addison-Wesley Professional, 2011, ISBN 0-321-57351-X.	Yes
Recommended Texts	Algorithms 3rd edition by R. Sedgewick, Addison-WesleyProfessional.	Yes
Websites	websites. Libraries sites in international universities.	

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	Digital Electronics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE225				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		2	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Ali A. Abed		**e-mail**	ali.abed@uobasrah.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE115	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understanding the design and analysis of digital electronic circuits depending on theoretical mathematical methods for design and analysis. 2. Introducing simulation programs (e.g. Multisim) for running digital circuits implementation to enhance practical capabilities. 3. Best practicing the theoretical concepts through the implementation of small class projects to facilitate students skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learning the basic concepts of digital logic gates. 2. Learning how to design NMOS and PMOS logic gates. 3. Learning how to design CMOS logic gates. 4. Learning how to design ECL and TTL logic gates. 5. Learning static and dynamic characteristics of logic gates. 6. Learning how to design SRAM, DRAM, ROM, Flip-Flops electronic circuits. 7. Learning the infrastructure design for advanced topic in digital systems and computer architecture.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1: Introduction to digital electronics 1. Ideal logic gates and its logic levels and analysis (4hrs). 2. Dynamic response of logic gates and its main parameters (4hrs) 3. NMOS logic design and analysis (4hrs) 4. NMOS complex logic circuits and its analysis (2hrs) 5. PMOS logic design (1hrs). Chapter 2: CMOS logic design 1. CMOS inverter design and characteristics (2hrs). 2. Dynamic behavior of CMOS inverters (2hrs). 3. Power calculations in CMOS circuits (2hrs). 4. Minimum size gate design and performance (2hrs). 5. Cascaded circuits (2hrs). Chapter 3: MOS memory and storage circuits 1. RAM memory (2hrs). 2. SRAM memory design and analysis (3hrs). 3. DRAM memory design and analysis (3hrs). 4. Address decoders design (2hrs). 5. ROM memory design (1hrs). 6. Flip-flops design (1hrs). Chapter 4: Bipolar logic circuits 1. TTL logic gates design, analysis, and requirements (4hrs). 2. ECL logic gates design, analysis, and requirements (3hrs). 3. BiCMOS logic (1hrs).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small simulation projects. 4. Class projects. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	78	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3 and 4
	Assignments	2	10% (10)	3, 13	LO #1, 2, 3 and 4
	Simulations	3	15% (15)	4, 6, 9	LO #1, 2, 3 and 4
	Class Project	1	5% (5)	13	LO # 1, and 2
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-3
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – VTC, ideal logic, noise margins, logic levels, design goals, dynamic response, rise time and fall time, propagation delay, PDP.
Week 2	NMOS logic design, inverter with resistive load, W/L ratio, load-line visualization, load resistor problems.
Week 3	Transistor alternative to the load resistor, saturated load inverter, NMOS NAND and NOR gates, Complex logic design, power dissipation.
Week 4	Dynamic behavior of MOS logic gates, PMOS logic.
Week 5	Introduction to CMOS logic design, CMOS inverter, Static characteristics, CMOS VTC, Noise margins.
Week 6	Dynamic behavior of CMOS inverters, propagation delay, rise and fall times, cascaded inverters,
Week 7	Static power dissipation, dynamic power dissipation, PDP, CMOS NOR and NAND gates, Transistor sizing, CMOS complex gates, minimum size design, cascade buffers.
Week 8	Introduction to MOS memory and storage circuits, random access memory, static memory cell (6-T cell), read and write operations.
Week 9	Dynamic memory cell, 1-T cell DRAM, read and write operation, 4-T cell, sense amplifier.
Week 10	Address decoders, ROM memory design, Flip-Flops design, D-Latch.
Week 11	Bipolar logic circuits, Current switch (emitter-coupled pair), Static behavior of the current switch, current switch analysis, ECL gate analysis and design, current source implementation.
Week 12	ECL OR-NOR gate, Emitter follower, PDP characteristics.
Week 13	Saturating bipolar inverter: analysis and design, TTL prototype, power analysis in TTL prototype, Fanout of TTL prototype.
Week 14	Standard 7400 TTL inverter, analysis and design, power consumption, PDP, Fanout, Multi-emitter logic gates, BiCMOS logic.
Week 15	**Preparatory week before the final Exam**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Microelectronic Circuit Design, Fourth Edition, Richard C. Jaeger and Travis N. Blalock	No

	https://tailieuhoctap123blog.files.wordpress.com/2016/06/microelectronic-circuit-design-4th-edition-jaeger1.pdf	
Recommended Texts		
Websites	websites. Libraries sites in international universities.	

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	Engineering Ethics			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE226				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		2	**Semester of Delivery**		4
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Ali Essam Hameed		**e-mail**	ali.haddad@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
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	This course is intended as an introduction to the different ethical dilemmas, concerns, and unforeseeable problems, which can arise when practicing the engineering profession. Course material employs case studies to explore the effects that engineering responses and solutions have and their ethical consequences. To better understand these consequences, the material organizes them into several categories of ethical pitfalls. The course aims to help future engineers evaluate their actions ethically and critically.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Engineering as a profession: Future transition from studying the subject to practicing it. 2. The ethical responsibilities when practicing the engineering profession. 3. Categories of ethical pitfalls when practicing the engineering profession. 4. Critical thinking within the field of engineering ethics. 5. Problem-response-consequence thinking paradigm.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Ethics, law, and profession [6 hrs] 2. Accuracy and rigor [10 hrs] 3. Honesty and integrity [8 hrs] 4. Respect for life, law, and public good [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification through class lectures. 2. Homework assignments 3. Project. 3. Short tests (quizzes). 4. Mid-term. 5. Final exam.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.866
Total SWL (h/sem)	75		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 12	LO #1, LO # 2-5
	Assignments	3	15% (15)	2, 6, 10	LO # 2-5
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	14	LO # 2-5
Summative assessment	Midterm Exam	1.5 hr	10% (10)	8	LO # 2-5
	Final Exam	2hr	50% (50)	16	LO # 2-5
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Engineering ethics: Origins, Managing the unknown
Week 2	Ethics and the law
Week 3	Ethics and the professions
Week 4	Staying within your limits
Week 5	Keeping up to date
Week 6	Ensuring others are not misled
Week 7	Being objective
Week 8	Evaluating risks
Week 9	Affecting others
Week 10	Preventing corruption
Week 11	Rejecting bribery
Week 12	Gaining trust
Week 13	Respect for life, law, and public good
Week 14	Justifying the work
Week 15	Health and safety
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Engineering ethics in practice : a guide for engineers", 2011	
Recommended Texts	C. Fleddermann, "Engineering Ethics", 4th ed., 2012	
Websites	"The Royal Academy of Engineering", www.raeng.org.uk	

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	Probability and Statistics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE222				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		2	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Emad A. Jasim		**e-mail**	emad.abdulrazaq@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE121	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to introduce students to this basic field of engineering sciences, which enables students to focus on studying mathematics and ways to clarify statistics for experiments or systems that are studied or analyzed and use them to solve problems and design systems in science and engineering such as calculating the rate and the amount of variance and others. The module introduces the principles of calculating the probability distribution and random variables such as the normal, exponential, uniform distribution, etc., and the operations that take place on them. It also introduces students to the principles of counting and its basic methods such as permutations, combinations, counting methods, and methods of proof and proof of mathematical laws. The module enables students to think logically in reasoning and to use rapid methods of counting.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarify the basic concepts of methodological methods in proof 2. Gain new skills in counting methods. 3. Gain basic skills to building computing systems. 4. Gain a basic understanding of how to expect results and make a study based on the expected results. 5. The ability to count and clarify the collected data in the simplest possible way. 6. The ability to think logically in deducing solutions to problems. 7. The ability to use fast counting methods. 8. The ability to gain experience in methods of proof
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Statistics. [8 hrs] 2. Counting. [4 hrs] 3. Probability Analyzing. [8 hrs] 4. Methods of counting Probability. [12 hrs] 5. Probability Distribution. [8 hrs] 6. Probability Distribution Functions. [8 hrs] 7. Expectation. [4 hrs] 8. Sampling and Estimation. [8 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects.

	4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	8, 13	LO #1, 2, 3, 5 and 7
	Assignments	3	15% (15)	3, 9, 14	LO # 1, 2, 3, 4, 5,6 and 7
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	15	LO # 1, 2, 3, 4, 5 6 and 7
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic of Statistics
Week 2	Histogram and Box plot
Week 3	Introduction of Probability
Week 4	Counting Techniques
Week 5	Types of Probability

Week 6	Tree Diagrams and Probability Models
Week 7	Conditional Probability
Week 8	Theorem of Total Probability
Week 9	Random Variables
Week 10	Continuous Distribution Functions
Week 11	Discrete Distribution Functions
Week 12	Some Special Distribution Functions
Week 13	Principles of Expectation and Moments
Week 14	Principles of Sampling and Estimation
Week 15	Confidence Interval
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	A First Course in Probability By Sheldon Ross	Yes
Recommended Texts	Fundamentals of probability and statistics for engineers , By T. T. Soong	Yes
Websites	websites. Libraries sites in international universities.	

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Computer Architecture			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE 331				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	Fatemah K. Al-Assfor		**e-mail**	Fatmah.hassan@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE214	**Semesters**	3
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Learn the basic CPU structure the performance factors. 2. Learn the algorithms to design of the common Fixed- Point arithmetic operations. 3. Learn how to design High speed CPU execution components and arithmetic and logic unit. 4. Learn the real number representations and the algorithms to design of the common floating- Point arithmetic operations. 5. Understand the memory hierarchies, cache memories & their mapping techniques and polices, and other memories. 6. Understand the types of system bus and the types of control unit. 7. Learn how to design processor system consists of Datapath and control path.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the basic structure of Computers, 2. Operations and Instructions. 3. Design Arithmetic and Logic Unit. 4. The ability to design fast combinational shifters and general-purpose registers 5. Learning the 6. Understand the Memory hierarchy system and cache memory work. 7. How the Control Unit is designed and how it communicates with other computer parts. 8. Design simple processor composed of Datapath and control path.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: (Theoretical and Tutorial Hours) 1. Digital Arithmetic and Introduction to computer architecture, CPU organization and its parts. Review of basic fixed- point number representation systems (non-negative and signed integers). [3 hrs] 2. Fixed- Point arithmetic operations: Design of 2-operand addition/ subtraction: (CRA, CLA), multi-operand addition (using carry save adder CSA), multiplication algorithms, Booth recoding multiplier. Division algorithms: (restoring and non-restoring) division. [15 hrs] 3. Highspeed CPU components: Design of combinational shifter (barrel shifter), general- purpose registers (GPR), Tri- state buffers, ALU design. [12 hrs] 4. Real number representations: IEEE754 floating-point (FP) representation and format (sign, exponent, and magnitude) of FP numbers, exceptions, special values, single- precision and double- precision format, dynamic range, integer to real numbers conversion. [6 hrs] 5. Floating- point Algorithms: FP addition/subtraction, multiplication, multiply- add fused (MAF) unit, division. [8 hrs] 6. Memory system hierarchy: role of memory system, High-Speed Memories: locality of reference, Cache Memory: (Organization and Mapping Techniques,

	Replacement Algorithms, write policies, cache performance, multi-level cache, split and unified cache). Main memory systems: Types of main memories: (SRAM, DRAM). [15 hrs] 7. Types of Bus Organization, control Unit purpose and operations: Instruction sequencing, Micro-operations and Register Transfer. Hardwired Control: Design methods – State table and classical method, Micro-programmed Control: Basic concepts, Design Examples - Multiplier CU. Microinstructions and micro- program sequencing. [15 hrs]. 8. Design a processor Datapath and control path, single cycle design and implementation; simplifying control design. [4 hrs] <u>Part B: (Lab Hours)</u> 1. Exploring VHDL simulation and verification to design simple combinational circuits. [3 hrs] 2. Design different adders. [3 hrs] 3. Explore the FPGA technology and synthesize several combinational circuit designs. [3hrs] 4. Design and implementation of MUX, DeMUX, Decoders and Encoders. [3 hrs] 5. Design and implementation of barrel shifter. 6. Design and Implementation of general- purpose register. [3 hrs] 7. Design and implementation of shift register. [3 hrs] 8. Design and implementation counters. [3 hrs] 9. Design and implementation of simple memory system. [3 hrs] 10. Design and implementation. [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Digital Arithmetic and Introduction to computer architecture, CPU organization and its parts. Review of basic fixed- point number representation systems (non-negative and signed integers). Fixed- Point arithmetic operations: Design 2-operand addition/ subtraction: CRA.
Week 2	Adder speeding up techniques. Carry- lookahead adder (CLA) concept. One level CLA, 2- level CLA, and multi- level CLA.
Week 3	Design multi-operand addition (using carry save adder CSA). multiplication algorithms, sequential unsigned multiplier

Week 4	Booth recoding, signed/unsigned recoding multiplier. Division algorithms, restoring division algorithm, non-restoring division algorithm.
Week 5	Highspeed CPU components: difference between sequential and combinational shifters, Design of combinational shifter (barrel shifter), one- level barrel shifter.
Week 6	Design of (nXm) one level barrel rotator, design two- level barrel shifter/rotator.
Week 7	Design general-purpose register (GPR) cell, design n-bit GPR with multi functions.
Week 8	Design arithmetic/logic unit (ALU), design tri-state buffer.
Week 9	Real number representations: IEEE754 floating-point (FP) representation and format (sign, exponent, and magnitude) of FP numbers, exceptions, special values, single- precision and double-precision format, dynamic range, integer to real numbers conversion.
Week 10	Floating- point Algorithms: FP addition/subtraction, multiplication, multiply- add fused (MAF) unit, division.
Week 11	Memory system hierarchy: role of memory system, High-Speed Memories: locality of reference, Cache Memory: (Organization and Mapping Techniques, Replacement Algorithms,
Week 12	Cache write policies, cache performance, multi-level cache, split and unified cache.
Week 13	Types of Bus Organization, control Unit purpose and operations: Instruction sequencing, Micro-operations and Register Transfer. Hardwired Control, State table and classical method.
Week 14	Micro-programmed Control: Basic concepts, Design Examples - Multiplier CU. Microinstructions and micro- program sequencing.
Week 15	Design a processor Datapath and control path, single cycle design and implementation; simplifying control design.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to VHDL Design, Simulation, and Verification.
Week 2	Lab 2: VHDL Structural Model, Design different adders.
Week 3	Lab 3: Explore the FPGA technology and synthesize.
Week 4	Lab 4: Design and synthesize several combinational circuits.
Week 5	Lab 5: VHDL Concurrent and Sequential Statements.
Week 6	Lab 6: Design and implementation of MUX, DeMUX, Decoders and Encoders.
Week 7	Lab 7: Design and implementation of barrel shifters

Week 8	Lab 8: Design of sequential circuits.
Week 9	Lab 9: Design and Implementation of general- purpose register.
Week 10	Lab 10: Design and implementation of shift register
Week 11	Lab 11: Design and implementation counters.
Week 12	Lab 12: Design and implementation of simple memory system.
Week 13	Lab 13: Design of state machine graph.
Week 14	Lab 14: Design simple control unit
Week 15	Lab 15: Design simple CPU system.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Digital Arithmetic, Miloš D. Ercegovac, Orginal Edition, 2003	No
Recommended Texts	Fundamentals of Digital Logic and Microcomputer Design, M. RAFIQUZZAMAN	Yes

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Analog Electronics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE315				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Ali A. Abed		**e-mail**	ali.abed@uobasrah.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE122	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understanding the design and analysis of analog op-amp electronic circuits depending on theoretical mathematical methods for design and analysis. 2. Introducing simulation programs (e.g. Multisim) for running some op-amp circuits implementation to enhance practical capabilities. 3. Best practicing the theoretical concepts through the lab and implementation of small class projects to facilitate students skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learning the basic concepts of operational amplifiers. 2. Learning how to design and analyze basic op-amp circuits. 3. Learning how to design and analyze special-purpose op-amp circuits. 4. Learning how to design and analyze active analog filters. 5. Learning how to design and analyze oscillators. 6. Learning how to design and analyze voltage and current op-amp regulators. 7. Learning the design and analysis of different classes of power amplifiers.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part (A): Chapter 1: The operational amplifier 1. Introduction to op-amps (1hrs). 2. Op-amp input modes and parameters (1hrs) 3. Negative feedback (1hrs) 4. Op-amp with negative feedback (1hrs) 5. Effect of feedback on impedance (1hrs). 6. Bias current and offset voltage (1hrs). Chapter 2: Basic op-amp circuits 1. Comparators (1hrs). 2. Summing amplifiers and subtractors (2hrs). 3. Integrators and differentiators (1hrs). Chapter 3: Special-purpose op-amp circuits 1. Instrumentation amplifiers (2hrs). 2. Isolation amplifiers (1hrs). 3. OTAs (1hrs). 4. Log and antilog amplifiers (1hrs). 5. Converters and other op-amp circuits (3hrs). Chapter 4: Active filters 1. Basic filter responses (2hrs). 2. Active LPF and HPF (2hrs). 3. Active BPF and BSF (2hrs). Chapter 5: Oscillators 1. Feedback oscillators (1hrs).

	2. RC oscillators (2hrs) 3. LC oscillators (1hrs) 4. Relaxation oscillators (1hrs) 5. 555 Timer as an oscillator (1hrs) Chapter 6: Voltage and current regulators 1. Voltage regulation (1hrs) 2. Series and shunt regulators (3hrs) 3. IC regulators (1hrs) 4. Current regulators (2hrs) Chapter 7: Power amplifiers 1. Class A power amplifier (2hrs) 2. Class B and AB push-pull power amplifiers (3hrs) 3. Class C amplifier (2hrs) 4. Darlington pair driver (1hrs) Part (B): Laboratory Experiment 1: Op-amp circuits implementation (8hrs). Experiment 2: Active filters implementation (4hrs) Experiment 3: Oscillators implementation (6hrs) Experiment 4: Voltage & current regulators implementation (6hrs) Experiment 5: Power supplies and power amplifiers (6hrs)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small simulation projects. 4. Class projects. 5. Short tests (quizzes). 6. Lab. 7. Mid-terms and final exams

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3 and 4,5,6
	Assignments	2	10% (10)	3, 13	LO #1, 2, 3 and 4,5,6
	Lab.	1	15% (15)	Continuous	
	Class Project	1	5% (5)	13	LO # 1, 2,3 and 4
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-4
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to op-amp, input modes and parameters, Negative feedback, op-am with feedback.
Week 2	Effect of feedback on impedance, bias current and offset voltage, open loop responses, closed loop responses.
Week 3	Comparators, summing amplifiers, subtractors.
Week 4	Integrator and differentiators, log and antilog amplifiers, analog multipliers.
Week 5	Instrumentation amplifiers, isolation amplifiers.
Week 6	Operational trans conductance amplifiers (OTA), converters and other op amp circuits.
Week 7	Basic filter responses, filter response characteristics, active LPF.
Week 8	Active HPF, active BPF, Active BSF, filter response measurement.

Week 9	Oscillators, feedback oscillators, oscillators with RC feedback circuits.
Week 10	Oscillators with LC feedback circuits, Relaxation oscillators, the 555 timer as an oscillator.
Week 11	Voltage regulation, basic linear series regulator, basic shunt regulators.
Week 12	Integrated circuit voltage regulators, current regulators, regulated dc power supplies.
Week 13	Class A power amplifiers, class B power amplifiers.
Week 14	Class AB push-pull amplifiers, Class C amplifiers, Darlington pair.
Week 15	**Preparatory week before the final Exam**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Op-amp circuits implementation
Week 2	Op-amp circuits implementation
Week 3	Op-amp circuits implementation
Week 4	Op-amp circuits implementation
Week 5	Active filters implementation
Week 6	Active filters implementation
Week 7	Oscillators implementation
Week 8	Oscillators implementation
Week 9	Oscillators implementation
Week 10	Voltage & current regulators implementation
Week 11	Voltage & current regulators implementation
Week 12	Voltage & current regulators implementation
Week 13	Power supplies and power amplifiers
Week 14	Power supplies and power amplifiers
Week 15	Power supplies and power amplifiers
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Electronic Devices, Ninth Edition, Thomas L. Floyd https://allbooksfordownloading.files.wordpress.com/2017/01/electronic-devices-by-floyd-9th-edition.pdf	No
Recommended Texts		
Websites	websites. Libraries sites in international universities.	

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	Artificial Intelligence			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE314				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Wasan A. Wali		**e-mail**	Wasan.wali@@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE224	**Semester**	4
Co-requisites module	Non	**Semester**	non

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Starting with an understanding of the philosophical underpinnings of AI this module will explore advanced AI techniques via the application and evaluation of neural networks, Fuzzy Logic, genetic algorithms, local search techniques, and Hybrid Systems. The aim is to give students an appreciation of the types of application areas and problems that advanced AI techniques can enhance and optimize including artificial intelligence in control systems applications, artificial intelligence in modeling, artificial intelligence, and artificial intelligence in industrial control.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Give students the foundations of essential concepts of Artificial Intelligence and Applications. 2- Improve the student's ability to use Artificial Intelligence (AI), which uses soft computing, and nature-inspired techniques to respond to computationally difficult problems with accuracy and robustness. 3- Students will cover in-depth, neural networks, Fuzzy logic, and evolutionary systems, and supplement this with hybrid systems. 4- Different types of agents will be considered: simple reflex agents, model-based reflex agents, goal-based agents and utility-based agents. 5- Concepts related to quantifying uncertainty in artificial intelligence. 6- Different approaches to learning will be discussed: supervised and unsupervised learning. Learning algorithms. 7- Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications. 8- Expert and Knowledge-based Systems with examples from real time Applications. 9- Autonomous Systems with examples from Industry Applications with Hybrid intelligent systems. 10- Improve the writing of scientific reports.
Indicative Contents **المحتويات الإرشادية**	**Course Topics:** **1- Introduction:** Intelligent machines, the history of artificial intelligence. **(3hrs)** **2- Expert system: (3hrs)** • What is knowledge, • Rules as a knowledge representation technique, • The main players in the expert system development team. **3- Expert system: (3hrs)** • Structure of a rule-based expert system, • Fundamental characteristics of an expert system, • Forward chaining and backward chaining inference techniques. **4- Expert system: (3hrs)** • Conflict resolution, • Advantages and disadvantages of rule-based expert systems,

- Summary.

5- Fuzzy expert systems: (3hrs)

- Introduction: what is uncertainty,
- Basic probability theory,
- what is fuzzy thinking,
- Fuzzy sets.

6- Fuzzy expert systems: (3hrs)

- Linguistic variables and hedges,
- Operations of fuzzy sets,
- Fuzzy rules
- Fuzzy inference.

7- Fuzzy expert systems: (3hrs)

- Building a fuzzy expert system,
- Fuzzy control system,
- Summary.

8- Artificial neural networks: (3hrs)

- Introduction: or how the brain works,
- The neuron as a simple computing element,
- The perceptron.

9- Artificial neural networks: (3hrs)

- Multilayer neural networks
- Accelerated learning in multilayer neural networks

10- Artificial neural networks: (3hrs)

- The Hopfield network,
- Bidirectional associative memory.

11- Artificial neural networks: (3hrs)

- Self-organising neural networks,
- Summary.

12- Genetic algorithms: (3hrs)

- Introduction: Can evolution be intelligent,
- Genetic algorithms,
- Evolution strategies,
- Summary.

13- Hybrid intelligent systems: (3hrs)

- Neural expert systems,
- Neuro-fuzzy systems.

14- Hybrid intelligent systems: **(3hrs)**

- Evolutionary neural networks.

15- Hybrid intelligent systems: (3hrs)

- Fuzzy evolutionary systems,
- Summary.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1- Explanation and clarification using the class lectures. 2- Tutorials hours. 3- Reading and self-learning. 4- Home Works. 5- Discussions and workshops 6- Reports. 7- Presentation. 8- Short tests (quizzes). 9- Training and activities during lecture. 10- Mid-terms and final exams.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	78	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3,7 and 8
	Assignments	3	15% (15)	3, 12	LO #3, 4,5 7,and 8
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	14	LO #3, 4, 5,6,7,8 and 10
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-10
	Final Exam	2hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: Intelligent machines, the history of artificial intelligence.
Week 2	Expert system: What is knowledge, Rules as a knowledge representation technique, The main players in the expert system development team.
Week 3	Expert system: Structure of a rule-based expert system, Fundamental characteristics of an expert system, Forward chaining and backward chaining inference techniques.
Week 4	Expert system: Conflict resolution, Advantages and disadvantages of rule-based expert systems, Summary.
Week 5	Fuzzy expert systems: Introduction: what is uncertainty, Basic probability theory, what is fuzzy thinking, Fuzzy sets.
Week 6	Fuzzy expert systems: Linguistic variables and hedges, Operations of fuzzy sets, Fuzzy rules Fuzzy inference.
Week 7	Fuzzy expert systems: Building a fuzzy expert system, Fuzzy control system, Summary.
Week 8	Artificial neural networks: Introduction: or how the brain works, The neuron as a simple computing element, The perceptron.
Week 9	Artificial neural networks: Multilayer neural Accelerated learning in multilayer neural networks.
Week 10	Artificial neural networks: The Hopfield network, Bidirectional associative memory.
Week 11	Artificial neural networks: Self-organising neural networks, Summary.
Week 12	Genetic algorithms: Introduction: Evolution can be intelligent, Genetic algorithms, Evolution strategies, Summary.
Week 13	Hybrid intelligent systems: Neural expert systems, Neuro-fuzzy systems.
Week 14	Hybrid intelligent systems: Evolutionary neural networks.
Week 15	Hybrid intelligent systems: Fuzzy evolutionary systems, Summary.
Week 16	**Preparatory week before the final Exam.**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Artificial Intelligence A Guide to Intelligent Systems, MICHAEL NEGNEVITSKY	No
Recommended Texts	1- Haykin, S., Neural Networks:a comprehensive foundation, 3rd ed, Pearson, 2009 2- D. Goldberg, Genetic Algorithms in Search, Optimisation & Machine Learning	N0
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	Engineering Economics			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE316				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		3	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Ghaida A. Al-Suhail		**e-mail**	ghaida.suhail@uobasrah.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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 introduce fundamental of Engineering Economics, which enables students to have knowledge on Making Economic Decision and how to select the best Alternative. The course deals with the principles of: 1. Economics Science 2. Engineering Cost & Cost Estimating, 3. Breakeven Analysis 4. Time Value of Money & Cash Flow Diagrams. 5. Simple and Compound Interests, Equivalence for Repeated Cash Flows. 6. Present Worth Analysis, Annual Cash Flow Analysis, Future Worth 7. Rate of Return, Benefit-Cost Ratio, and Payback Period 8. Projects Evaluation to choose Best Alternative. 9. Depreciation Principles and Analysis Methods. 10. Renewable Energy Projects 11. Sustainability Issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learning the basic concepts of engineering economics. 2. Gaining a basic understanding of engineering cost, Time Value of Money & Cash Flow, Breakeven Analysis, Rate of Return, Payback Period 3. Learning how to make economic-decision to select the best alternative. 4. Acquiring skills in economic analysis of engineering projects. 5. Providing knowledge on Renewable Energy Projects. 6. The ability to understand the principles of depreciation & Inflation analysis. 7. The ability to think logically in solving a specific problem. 8. The ability to understand the Sustainability Issues
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Fundamentals on Economics Science [2hrs] 2. Engineering Cost & Cost Estimating [2hrs] 3. Breakeven Analysis [2hrs] 4. Time Value of Money & Cash Flows, Simple & Compound Interests [4hrs] 5. Present Worth Analysis, Annual Cash Flow Analysis, Future Worth [4hrs] 6. Equivalence for Repeated Cash Flows. [4hrs] 7. Rate of Return, Benefit-Cost Ratio, and Payback Period [2hr] 8. Projects Evaluation to choose Best Alternative. [4hrs] 9. Depreciation Analysis Methods & Inflation Analysis [2hrs] 10. Renewable Energy Projects & Sustainability Issues. [2hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. On-minute Challenge (Turning in) 3. Share-learning with a partner or a group in the class. 4. Self-learning using homework and small projects. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.87
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, 5 and 7
	Assignments	2	15% (10)	2, 6,10	LO # 1,3, 5 and 6
	Projects/ Lab.	-	-	-	
	Report	1	15% (10)	13	LO # 1,4,5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Concepts and Definitions in Economics
Week 2	Introduction -Type of Economics Systems, Engineering Economic and Decision-Making
Week 3	Engineering Costs Types, Margin Costs, Project Life-Cycle Phases,
Week 4	Break-even Graph (Costs & Revenues),Profit/Loss
Week 5	Break-Even (Cost-Profit-Volume) Analysis, Marginal Costing, Income Statement
Week 6	Cost Estimating Models: Power-Sizing, Cost Index, Learning Curve
Week 7	Interest Rate & Time Value of Money, Concepts of Cash Flow Diagram
Week 8	Cash Flow Diagram-Economic Equivalence, Types of Payments: Single, Annual and Gradient
Week 9	Cash Flow Diagram -Gradient Payment Series
Week 10	Equivalence Methods- Net Present Value: Single Investment, Multiple Investments Projects
Week 11	Rate of Return Methods (ROR): IRR, ERR, Payout
Week 12	Types of Depreciations, Depreciation Methods (SL and MSL)
Week 13	Inflation Analysis- Inflation Rate Estimation, CPI Indicator, GDP Deflator
Week 14	Energy Economics- Energy-Pay-Back Time, Renewable Energy Economics
Week 15	Different topics- Sustainability Issues
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- (Synthesis Lectures on Engineering) David L. Whitman, Ronald E. Terry-Fundamentals of Engineering Economics and Decision Analysis, Morgan & Claypool Publishers (2012) 2- Donald C. Newnan et al., Engineering Economic Analysis, 9th Ed., 2004, Oxford University	Electronic Book (PDF)
Recommended Texts	Chan S. Park. Fundamentals of Engineering Economics. Pearson Education (2012), (2004).	Electronic Book (PDF)
Websites	https://easyengineering.net/engineering-economics-by-panneerselvam-book	

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	Linear Algebra			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE311				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	Mohammed A. Al-Ibadi		**e-mail**	Mohammed.joudah@uobasra.edu.iq	
Module Leader's Acad. Title	Asist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE221	**Semester**	5
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	At its root, linear algebra is the study of systems of linear equations. Systems of linear equations are ubiquitous in the natural and social sciences. One major contribution to the topic was made by Gauss (1777–1855), who was confronted with large systems of linear equations in his work on astronomy and developed the famous method of least squares to cope with measurement errors. Later in the nineteenth century Cauchy, Sylvester, Cayley and others developed the concept of a matrix, which provides the most convenient language for the theory and practice of linear equations. Matrices are intricate algebraic objects with many fascinating properties, but they also provide a bridge between linear equations and vectors, so infusing the subject of linear algebra with a strong geometric flavor. We will delve into all these topics, as well as the notions of determinant and eigenvalues, which are important numbers associated with any square matrix.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Clarify the basic concepts of linear systems and their applications in practical fields. 2- Acquire the skill of solving linear systems. 3- Acquire basic skills in the use of matrices and their applications in solving linear systems. 4- Acquire the skill of how to use the computer to process solving matrices that represent linear systems. 5- Introducing some applications to problems related to ordinary differential equations as an important application of linear systems 6- Introducing some applications to problems related to partial differential equations as an important application of linear systems 7- Achieving the a to k criterion. 8 - quick dealing with matrices that represent linear systems. 9 - Quick dealing with ordinary differential equations and how to convert them into linear systems. 10 - Quick dealing with partial differential equations and how to convert them into linear systems. 11 - Writing and organizing algorithms in different programming languages to solve linear systems. 12- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom. 13- Response: monitor the student's interaction with the material that displayed on the screen.

	14- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed. 15- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it. 16 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget. 17 - Develop the student's ability to interact with technology. 18 - Develop the student's ability to interact with the Internet. 19 - Develop the student's ability to interact with multimedia. 20 - Develop the student's ability to discuss and debate.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to systems of linear equations, how to solve systems of linear equations Row reduction method. [6 hrs] 2. Echelon forms, Pivot variables. [6 hrs] 3. General and parametric solutions, Augmented matrix, Pivot and free variables, Transformation matrices, Scaling and interchanging matrices, LU Decomposition, Solving using LU Decomposition. [21 hrs] 4. Inverse of a Matrix, Gause – Jordan elimination method. [6 hrs] 5. Adding and Scaling Vectors, Linear combination. [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the lectures. 2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning using homework and small projects. 4. projects. 5. Short tests (quizzes). 6. Homework. 7. Mid-terms and final exams for both theoretical and practical subjects. 8. Student's interacting during the lecture.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem)	78	**Unstructured SWL (h/w)**	5.2

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	5, 10	LO #1, 5, 9 and 15
	Assignments	3	15% (15)	2, 12	LO # 3, 4, 6, 7, 11, 16
	Projects / Lab.	-	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8, 10, 11, 15, 18
Summative assessment	**Midterm Exam**	1.5 hrs	10% (10)	7	LO # 1-12
	Final Exam	2 hrs	50% (50)	20	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to systems of linear equations
Week 2	How to solve systems of linear equations.
Week 3	Row reduction method
Week 4	Echelon forms
Week 5	Pivot variables
Week 6	General and parametric solutions
Week 7	Augmented matrix
Week 8	Pivot and free variables
Week 9	Transformation matrices
Week 10	Scaling and interchanging matrices
Week 11	LU Decomposition
Week 12	Solving using
Week 13	LU Decomposition
Week 14	Inverse of a Matrix

Week 15	Gause – Jordan elimination method
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Linear Algebra and its Applications by David C. Lay	Yes
Recommended Texts		No
Websites	websites. Libraries sites in international universities.	

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	Operating System			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE313				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Musaab A. Alaziz		**e-mail**	mosab.adil@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**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 convey a thorough understanding of the basics of an operating system by studying techniques and algorithms for providing services in a computer system, and to understand implementation aspects of popular systems by means of case studies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarify the basic concepts of computer organization. 2. Gain new skills in Process management, synchronization. 3. Gain the skills to deal with processes scheduling and deadlocks 4. Understanding Memory management, virtual memory. 5. Understanding I/0 management, file systems. 6. Gain basic understanding in Protection and Security.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: (Theoretical and Tutorial Hours) 1. **History and overview**. [6 hrs] 2. **Process Management**. [6 hrs] 3. **Threads**. [3 hrs] 4. **Scheduling and dispatch**. [6 hrs] 5. **Process Synchronization**. [6 hrs] 6. **Deadlock**. [6 hrs] 7. **Memory Management**. [6 hrs] 8. **File systems**. [3 hrs] 9. **Protection and Security**. [3 hrs] Part B: (Lab Hours) 1. Exploring [8 hrs] 2. Exploring. [4 hrs] 3. Exploring. [2 hrs] 4. Real. [4 hrs] 5. Mixed of experiments of previous topics. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures.

	2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**History and overview**- Introduction, Hardware: CPU, memories, Memory hierarchy, I/O devices, I/O interrupts, DMA, Firmware: BOIS, Software, Operating systems review and its roles, Types of operating systems, Time sharing, Concurrency, System programs,
Week 2	**History and overview** - Operating system structures, Operating system components, Microkernel, System calls and APIs, Interrupts, General definitions: Buffering, resources, device management, device driver, caching, crash…etc.
Week 3	**Process Management**- Processes, Process state diagram, Process control block (PCB), Context switch, Process scheduling,
Week 4	**Process Management**- Queuing diagram, Schedulers, Types and operation of processes., Bounded-buffer problem.
Week 5	**Threads-** Definition, Benefits, Types of threads, Multithreading models, Java threads, Java thread management, Java thread states, Producer-consumer problem.
Week 6	**Scheduling and dispatch** - CPU-I/O burst cycle, Preemptive and non-preemptive scheduling,
Week 7	**Scheduling and dispatch** - Dispatcher, Scheduling criteria, Multi-processor and multiple core scheduling.
Week 8	**Process Synchronization -** Define the problem, Race condition, Critical section problem, Mutual exclusion,
Week 9	**Process Synchronization -** Semaphore, Starvation, Producer-consumer problem, Monitors
Week 10	**Deadlock -** Definition, Deadlock characterization, Necessary conditions, Resource allocation graph
Week 11	**Deadlock -** Deadlock prevention, avoidance, and recovery. Process termination.
Week 12	**Memory Management -** Address binding, Logical vs. physical address space, Static and dynamic loading and linking
Week 13	**Memory Management -** Overlaying and swapping, paging, segmentation, fragmentation, Memory hierarchy
Week 14	**File systems -** Definition, attribute, types, access methods, Directory, Allocation methods, Consistency checking, Backup and restore, Disk management.
Week 15	**Protection and Security -** Goals of protection, Domain of protection, Access matrix, Access control and rights, Cryptography, User authentication, Firewall
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Guide to Ubuntu Linux System.
Week 2	Lab 2: Working with directories.
Week 3	Lab 3: Manage files in Linux.
Week 4	Lab 4: Shell File's Features.

Week 5	Lab 5: Identifying & Creating Commands.
Week 6	Lab 6: Redirection: "Working with File Contents"
Week 7	Lab 7: Working with cat- command options
Week 8	Lab 8: Filters: sort, search, and displaying file contents.
Week 9	Lab 9: Archives and Compression.
Week 10	Lab 10: vi text editor.
Week 11	Lab 11: Linux file tree.
Week 12	Lab 12: Arguments, echo and white space, and shell expansions
Week 13	Lab 13:shell embedding and options.
Week 14	Lab 14: Mixed of experiments of previous topics.
Week 15	Lab 15: Mixed of experiments of previous topics.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Silberschatz, Galvin, and Gagne. Operating System Concepts. John Wiley & Sons.	Yes
Recommended Texts	none.	
Websites	websites. Libraries sites in international universities.	

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	Instrumentation			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE 237				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		3	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Alaa Al-Ibadi		**e-mail**	Alaa.abdulhassan@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE215	**Semester**	3
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Principle of measurement. 2. Measuring electrical quantities. 3. Analogue and digital transducers. 4. Measurement of level, pressure, flow, temperature and other industrial measurements. 5. Operation principle of DC, Servo, and Steeper motors.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learning the Principle of measurements. 2. Learning the main measurement systems. 3. Learning how to measure analogue and digital quantities. 4. Using different basic and developed devices. 5. The ability to select the proper measurement instrument. 6. Learning the design and operation of sensors. 7. Learning the operation of DC, Servo, and Steeper motors.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Theoretical and Tutorial Hours **1. Introduction:** Instrumentation applications, SI Units, Fundamental and derived units, Elements of measuring instruments, Feedback system. Types of instruments, precision and accuracy. Primary measurement and secondary measurement. (6 hrs) **2. Electrical Measurements:** Galvanometer, Voltage measurement, Current measurement, Resistance measurements. Electronic measurement devices. D.C. and A.C. Bridges. (4 hrs) **3. Electrical Transducers:** Resistive, Inductive and Capacitive transducers, measurement of transducer output, modulation and demodulation in transducers. (6 hrs) **4. Industrial measurements:** Level measurement, Pressure measurement: Burden tube, Bellows, Diaphragms, Differential pressure measurement, Flow measurement, Temperature measurement, Force, Load cell. (4 hrs) **5. Digital Transducers:** Opt couplers and OID, optical detection, magnetic pickups, Speed measurement, Position measurement, principle of mouse. Other digital transducers. (4 hrs) **6. Motors:** Operation principle of DC, Servo, and Steeper motors. (6 hrs)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 7. Mid-terms and final exams for theoretical subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.53
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	20% (20)	4, 7, 10	LO #1, 2, 3, and 4
	Assignments	2	10% (10)	3, 11	LO # 2, 3 and 4
	Report	1	10% (10)	13	LO # 4 and 5
Summative assessment	**Midterm Exam**	1.5 hrs	10% (10)	8	LO # 1-3
	Final Exam	2 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Instrumentation applications, SI Units, Fundamental and derived units.
Week 2	Elements of measuring instrument, Feedback system. Types of instruments.
Week 3	Precision and accuracy. Primary measurement and secondary measurement.
Week 4	Galvanometer, Voltage measurement, Current measurement, Resistance measurements.
Week 5	Electronic measurement devices. D.C. and A.C. Bridges.
Week 6	Resistive, Inductive and Capacitive transducers.
Week 7	Measurement of transducer output.
Week 8	Modulation and demodulation in transducers.
Week 9	Level measurement, Pressure measurement: Burden tube, Bellows, Diaphragms.
Week 10	Differential pressure measurement, Flow measurement, Temperature measurement, Force, Load cell.
Week 11	Optical couplers and OID, optical detection, magnetic pickups, Speed measurement
Week 12	Position measurement, the principle of the mouse, and the other digital transducers.
Week 13	DC motors.
Week 14	Servo Motors.
Week 15	Stepper Motors.
Week 16	**A preparatory week before the Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Measurement and Instrumentation. Theory and Application Reza Langari and Alan S. Morris	No
Websites	websites. Libraries sites in international universities.	

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 Maintenance			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE325				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		3	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	Hanady S.Ahmed		**e-mail**	hanady.ahmed@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant lecture	**Module Leader's Qualification**		M.Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Introducing hardware concepts to a student. 2. Early detection of computer problems. 3. Define a computer as an electronic machine that can store information Design input/output ports with specific addresses. 4. Identify commonly used computer devices and explain their usage of Programmable timers. 5. give a strong foundation on the most fundamental concepts of computer hardware and operating systems. 6. Explain the purpose of the most commonly used hardware devices. 7. Assemble a computer system. 8. Configure and troubleshoot hardware devices
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Students can identify the basic elements required in a computer system. 2. Students can recognize the role of the computer for personal and professional uses. 3. Students can differentiate between the main types of computers. 4. The ability to disassemble and reassemble computers and their components without creating any additional damage. 5. The ability to interact with hardware designs. 6. The ability to Format and install a new operating system. 7. The ability to Properly identify hardware and software problems and suggest repairs.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A: (Theoretical Hours)</u> 1. General Introduction to Computer Systems. [1 hr] 2. Exploring the Hardware Components: 1.1 Explanation of PSU, components and working concept. [2 hrs] 1.2 Explanation of CPU, types and features. [2 hrs] 1.3 Explanation of RAM types. [1 hr] 1.4 Explanation of Motherboard , the work of each part. [3 hrs] 1.5 Explanation of Serial and Parallel Ports. [1 hr] 1.6 Explanation of various types of storage devices. [2 hrs] 3. Exploring Windows installation, essential programs, and drivers. [3 hrs] <u>Part B: (Lab Hours)</u> 1. Exploring the Hardware Components: 1.1 Connect Power supply unit, AC and DC, functions of a PSU, and safety measures. [2hrs] 1.2 Inserting the CPU and the motherboard. [4 hrs] 1.3 Connecting RAM. [1 hrs]

	1.4 Install hard disk [3 hrs] 1.5 CD-writers installing and working[2 hrs] 1.6 Ports connectors and cables: serial port, PS/2 port, parallel port, USB, FireWire port, COM port [4 hrs] 1.7 Storage systems: fixed disks, removable media, backup systems, precautions taken when handling storage media. [4 hrs] 2. Assembling all computer parts. [8 hrs] 3. Install windows. Start windows from CD-ROM. Use bios to change the boot sequence, complete an unattended installation.[1 hr] 4. Revision install windows XP. [1 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Theoretical hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.13
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	53	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.53
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	Midterm Exam	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	General Introduction of Computer System
Week 2	Motherboard
Week 3	processors
Week 4	Computer memory
Week 5	Hard Disk Drive
Week 6	Computer Ports
Week 7	Expansion Bus
Week 8	Disk and Disk drives
Week 9	Booting Process
Week 10	Logical fault finding
Week 11	How to assemble the computer from the previous parts
Week 12	A disk management tool, create partitions, logical drives, and volume properties.
Week 13	Install windows XP
Week 14	Revision install Windows XP
Week 15	Software maintenance
Week 16	A preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: PC Power supply
Week 2	Lab 2: Motherboard
Week 3	Lab 3: processors
Week 4	Lab 4: Computer memory
Week 5	Lab 5: Hard Disk Drive
Week 6	Lab 6: Computer Ports
Week 7	Lab 7: Expansion Bus
Week 8	Lab 8: Disk and Disk drives
Week 9	Lab 9: Booting Process
Week 10	Lab 10: Logical fault finding
Week 11	Lab 11: Assembling the computer from the previous parts
Week 12	Lab 12: Completing assembling the computer
Week 13	Lab 13: Format a hard disk and install an operating system
Week 14	Lab 14: Installing scientific and necessary programs
Week 15	Lab 15: Review of previous topics.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	PC Operation and Repair, KF Ibrahim	Yes
Recommended Texts	Computer-Managed Maintenance Systems, William W. Cato, R. Keith Mobley	No
Websites	websites. Libraries sites in international universities.	

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	Digital Communications			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE324				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	Ghaida A. Al-Suhail		**e-mail**	ghaida.suhail@uobasrah.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**	ghaida.suhail@uobasrah.edu.iq	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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 reviews the theory of Digital communication systems including different types of modulations, encoding and multiplexing techniques. It also demonstrates the performance of digital systems and the guided and unguided transmission media. Cellular networks are also included. The aims are listed as follows: 1. To introduce a theoretical fundamentals in digital communication theory and information transmission. 2. To develop problem solving skills & understanding of digital communication theory through various transmission techniques. 3. This course deals with basics of data communication, data networking and OSI and TCP/IP models (Internet). 4. The course includes Shannon & Nyquist theory, and channel impairments. 5. The course mainly focuses on analog-to-digital modulations and line coding. 6. The course deals with multiplexing techniques & guided media in optical communication and unguided media. 7. To understand the principles of spread spectrum and cellular networks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion, the students will have the knowledge and skills to: 1. Learn how analog –to-digital conversion works in digital communication. 2. Identify the basics of various data communication techniques. 3. Explain Signals, Sampling theory, Shannon Theorem & Channel impairments. 4. Analyze the performance of digital modulations over AWGN channels. 5. Learn how to design Multiplexing Systems and define Line Coding. 6. Acquire a basic evaluation of digital receiver performance. 7. Recognize the Guided/Unguided Transmission. 8. Gain basic principles of Spread Spectrum and Cellular Networks 9. Apply engineering design practice in a laboratory setting, individually, or in small team.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: (Theoretical and Tutorial Hours) 1. Introduction on Digital Communications such as digital signals, bit rate, bandwidth, baud rate, Synchronous & asynchronous,- Bit and byte orient transmission modes, Packet and Message Switching) [9hrs] 2. Network Models (OSI Model and TCP/IP Model) [3hrs] 3. Physical Layer: Digital/Analogue Bandwidth, Noiseless Channel (Nyquist theorem), Noisy Channel (Shannon theorem), Transmission Impairments: Attenuation, Delay Distortion, AWGN Noise Gaussian, impulsive and shot noise) and losses (optical, coaxial, radio), BER (Bit- error-ratio) and S/N ratio [9hrs]

4. Digital Modulations: Line Coding, Analog Modulations, Pulse and Code Modulations (PTM, PCM, DM), Digital-To-Analogue Modulation Techniques (ASK, PSK, FSK, QAM) [6hrs]
5. Multiplexing Techniques FDM/WDM/TDM/CDMA. [6hrs]
6. Transmission Media: Guided (coaxial, Optical fiber), Wireless media and Satellite Networks [6hr]
7. Spread Spectrum, DSSS,FHSS and Cellular Networks [6hrs]

Part B: (Lab Hours)

1. Exploring the Analog Modulations: [8hrs]
   1.1 Amplitude Modulation (DSB/SSB Transmitter and Receiver):
   Baseband and Carrier Modulation,
   Part-1: Double Sideband AM Generation (DSB)
   Part-2: Calculation of DSB Modulated Signal Using Trapezoid Pattern
   Part-3: Double Sideband Reception
   Part-4: Phase Locked Loop Detector
   1.2 Frequency Modulation: [8hrs]
   Part-1: Frequency Deviation and Modulation Index
   Part-2: Marker Insertion to Evaluate Frequency Deviation
   Part-3: FM Signal Spectrum
   Part-4: Phase Locked Loop Detector

2. Exploring the Frequency Division Multiplexing (FDM). [4hrs]
   Part-1: FDM Multiplexing/De-multiplexing with Sinusoidal
   Part-2: FDM Multiplexing/De-multiplexing with Audio Signals
   Part-3: Study of DSBC Modulation/Demodulation
3. Exploring the Pulse Coded Modulation (PCM) [4hrs]
   Part-1: PCM: Sampling, Quantization, Coding,
   Part-2: Differential PCM-Demodulation
   Part-3: DPCM Differentiation Process Study
4. Exploring the Digital Modulations. [4hrs]
   Part-1: Types of Sampling Theory, Sampling Types: Natural and Flat-Top, Sample-and Hold, Pulse Modulation Techniques
   Part-2: PAM Modulation/De-Mod Using Different Sampling Techniques
   Part-3: Pulse Width Modulation/De-Modulation Using Different Sampling Techniques
5. Exploring the Code Division Multiplexing (CDMA) & Mixed of experiments of previous topics. [2hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4, and 8
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered

Week 1	Introduction - Concepts and Definitions in Digital and Data Communications
Week 2	Types of Nodes and Networks, Packet &Message Store-and Forward Transmission
Week 3	Transmission Modes Bit & Character, Synchronization & Framing
Week 4	Network Models: OSI Model and TCP/IP Model
Week 5	Digital/Analogue Bandwidth, Noiseless Channel (Nyquist Bit Rate), Noisy Channel (Shannon Capacity)
Week 6	Transmission Impairments: Attenuation, Delay Distortion, AWGN Noise, Impulsive Noise, Shot Noise
Week 7	Digital Transmission: Line Coding, Analog Modulations, Pulse Modulations (PTM, PCM, DM)
Week 8	Digital-To-Analogue Modulation Techniques (ASK, PSK, FSK, QAM)
Week 9	Multiplexing Techniques: Analog Multiplexing-FDM, WDM,
Week 10	Digital Multiplexing- TDM, CDM/CDMA
Week 11	Transmission Loss in Guided (Optical Transmission system) and Unguided (Wireless) Media
Week 12	Satellite Networks
Week 13	Spread Spectrum, Direct Sequence Spread Spectrum, Frequency Hopping
Week 14	Cellular System Principles, Frequency Re-Use , Increasing Capacity
Week 15	Different topics- Discussion and revision
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Amplitude Modulation Part-1: Double Sideband AM Generation (DSB)
Week 2	Lab 2: Part-2: Calculation of DSB Modulated Signal Using Trapezoid Pattern.
Week 3	Lab 3: Part-3: Double Sideband Reception
Week 4	Lab 4: Part-4: Phase Locked Loop Detector
Week 5	Lab 5: FM Communication: Part-1: Frequency Deviation and Modulation Index
Week 6	Lab 6: FM Communication: Part-2: Marker Insertion to Evaluate Frequency Deviation
Week 7	Lab 7: FM Communication: Part-3: FM Signal Spectrum
Week 8	Lab 8: FM Communication: Part-4: Phase Locked Loop Detector
Week 9	Lab 9: Frequency Division Multiplexing: Part-1: FDM Multiplexing/De-multiplexing with Sinusoidal
Week 10	Lab 10: Frequency Division Multiplexing:Part-2:FDM Multiplexing/De-multiplexing with Audio Signals
Week 11	Lab 11: Pulse Coded Modulation (PCM) Part-1: PCM: Sampling, Quantization, Coding,
Week 12	Lab 12: Pulse Coded Modulation (PCM) Part-2: Differential PCM-Demodulation and Part-3: DPCM Differentiation Process Study

Week 13	Lab 13: Digital Modulations. Part-1: Exploring Types of Sampling Theory, Sampling Types: Natural Flat-Top, Sample-and Hold, Pulse Modulation Techniques
Week 14	Lab 14: Part-2: PAM Modulation/De-Mod Using Different Sampling Techniques Part-3: Pulse Width Modulation/De-Modulation Using Different Sampling Techniques.
Week 15	Lab 15: Exploring CDMA with Mixed of experiments of previous topics.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	B. Forouzan, Data Communications and Networking, 3rd Ed. 2003 (2007) W. Tomasi, Introduction to Data Communications and Networking, (2000) الكتب المجانية A. Carlson, Communication Systems, 1998	Yes
Recommended Texts	W. Stallings, Data and Computer Communications, 8th Edition, International 2009.	No
Websites	Websites. Libraries sites in international universities. https://www.mhhe.com/engcs/compsci/forouzan/	

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	Digital Signal Processing			**Module Delivery**	
Module Type	Elective			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE326				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Hassanin S. Al-Fahaam		**e-mail**	hassanin.husein@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module	CoE415	**Semester**	7

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarify the basic concepts of Fundamentals of discrete time signals systems. 2. Gain new skills relationships between system representations. 3. Gain basic skills in computation of frequency response. 4. Gain basic understanding of discrete system programming and Digital filter design.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A: (Theoretical and Tutorial Hours)</u> 1. Fundamentals of discrete time systems: introduction, basic definitions, important Discrete Time (DT) signals, DT systems, and Fourier transform of sequences. [15 hrs] 2. The Z transform: definition of Z-transform, inverse Z-transforms, relationships between system representations, computation of frequency response. [10 hrs] 3. Realizations of digital filters: direct form realizations of IIR filters, cascade realizations of IIR filters, parallel realizations of IIR filters, and realizations of FIR filters. [10 hrs] 4. Digital filter design: design of IIR and FIR filters. [10 hrs] 5. Discrete Fourier transform: properties, circular convolution, and Fast Fourier Transform. [10 hrs] <u>Part B: (Lab Hours)</u> 1. Exploring the Fundamentals of discrete time systems: introduction, basic definitions, important Discrete Time (DT) signals, DT systems, and Fourier transform of sequences. [6 hrs]

	2. Exploring the Z transform: definition of Z-transform, inverse Z-transforms, relationships between system representations, computation of frequency response. [6 hrs] 3. Exploring the Realizations of digital filters: direct form realizations of IIR filters, cascade realizations of IIR filters, parallel realizations of IIR filters, and realizations of FIR filters. [6 hrs] 4. Exploring the Digital filter design: design of IIR and FIR filters. [6 hrs] 5. Exploring the Discrete Fourier transform: properties, circular convolution, and Fast Fourier Transform. [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2 and 3
	Assignments	2	10% (10)	3, 13	LO # 1, 2 and 3
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 1,2 and 3
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-3
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	introduction, basic definitions, important Discrete Time (DT) signals.
Week 2	introduction, basic definitions, important Discrete Time systems.
Week 3	Fourier transforms of sequences.
Week 4	definition of Z-transform.
Week 5	inverse Z-transforms.
Week 6	relationships between system representations, computation of frequency response.
Week 7	direct form realizations of IIR filters.
Week 8	cascade realizations of IIR filters.
Week 9	parallel realizations of IIR filters.
Week 10	realizations of FIR filters.
Week 11	design of IIR.
Week 12	design of FIR.
Week 13	Properties of DTFT.
Week 14	circular convolution.
Week 15	Fast Fourier Transform “FFT”.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab. 1: introduction, basic definitions, important Discrete Time (DT) signals.
Week 2	Lab. 2: introduction, basic definitions, important Discrete Time systems.
Week 3	Lab. 3: Fourier transforms of sequences.
Week 4	Lab. 4: definition of Z-transform.
Week 5	Lab. 5: inverse Z-transforms.
Week 6	Lab. 6: relationships between system representations, computation of frequency response.
Week 7	Lab. 7: direct form realizations of IIR filters.
Week 8	Lab. 8: cascade realizations of IIR filters.
Week 9	Lab. 9: parallel realizations of IIR filters.
Week 10	Lab. 10: realizations of FIR filters.
Week 11	Lab. 11: design of IIR.
Week 12	Lab. 12: design of FIR.
Week 13	Lab. 13: Properties of DTFT.
Week 14	Lab. 14: circular convolution.
Week 15	Lab. 15: Fast Fourier Transform “FFT”.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Digital Signal Processing I) using the 4th edition of the Proakis & Manolakis DSP textbook	Yes
Recommended Texts	Digital Signal Processing (DSP): Fundamentals, Techniques and Applications.	No
Websites	websites. Libraries sites in international universities.	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group	**A -** Excellent	امتياز	90 - 100	Outstanding Performance

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Microprocessor Interface			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE322				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Mohammed A. Ali		**e-mail**	mohammed.joudah@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE223	**Semester**	4
Co-requisites module	CoE411	**Semester**	7

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Minimum-mode and maximum-mode operation of 8088/8086 microprocessors 2. System clock, bus cycles, and time states. 3. Memory organization and address space. 4. Demultiplexing the address/data buses. 5. Memory devices and subsystem design. 6. Input/ output interface. 7. Memory mapped input/output. 8. Design of input/output ports with specific addresses. 9. Programmable input/output. 10. Programmable timers. 11. Interrupt address pointer, masking of interrupt, software interrupt, non-maskable interrupt, and reset. 12. Programmable interrupt controller. 13. Direct memory access and DMA programmable controller. 14. Serial communication and its programmable controller.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learning the basic concepts of memory and input and output interfaces. 2. Learning how to design memory subsystem and input and output ports. 3. Designing programs for managing input and output data. 4. Understanding the operation of programmable input and output devices. 5. The ability to implement hardware designs for specific problems. 6. The ability to interact with hardware designs through software. 7. The ability to design dedicated and general-purpose ports, both fixed and programmable. 8. The ability to handle interrupts and transfer data to and from the CPU.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A: (Theoretical and Tutorial Hours)</u> 1. The 8088/8086 memory and input/output interface, minimum-mode and maximum-mode operations. [3 hrs] 2. System clock, bus cycles, and time states. [3 hrs] 3. Hardware organization of memory address space. [3 hrs] 4. Memory devices and design of memory sub-systems. [3 hrs] 5. Handshaking, buffering, I/O read and write bus cycles. [3 hrs] 6. Design of isolated and memory-mapped I/O and port address decoding. [3 hrs] 7. (8255 PPI) internal architecture, port description, programming and modes of operation and interfacing with microprocessor. [6 hrs] 8. Programmable interval timer (8254 PIT) internal architecture, counters, programming, modes of operation, and Interfacing. [6 hrs]

	9. Vectored and prioritized interrupts, interrupt handling, interrupts service routine's structure, software interrupt, internal interrupt, non-maskable interrupt, reset, external hardware interrupt, Programmable interrupt controller (8259 PIC) internal architecture and programming. [9 hrs] 10. Programmable direct memory access controller (8237 DMA controller), programming and interfacing. [3 hrs] 11. Serial communications and programmable communication interface (8251 PCI) internal architecture, programming, and interfacing. [3 hrs] Part B: (Lab Hours) 1. Exploring the software Interrupts: 1.1 Interrupt function call (INT 21): Keyboard Input (function 1), Display Output (function 2), Print String (function 9), Buffered Keyboard Input (function 0A). [8 hrs] 1.2 Interrupt function call (INT 10): Setting The cursor, Clear Screen. [2 hrs] 1.3 INT 21, function calls 9 & 0A: Using DOS to display ASCII characters set. [2 hrs] 1.4 Using mixed function calls to do the following: Clear screen, set curser, display prompt, name entered, scroll & color screen, screen paging, and center & display name. [4 hrs] 2. Exploring the I/O subsystem of IBM PC: Programming 8253 PIT and 8255 PPI, and Control the speaker of the IBM PC. [4 hrs] 3. Exploring the Interrupt subsystem: Determine the starting address of an interrupt service routine (ISR), explore the code of an interrupt service routine, and execute different software interrupt service routines. [2 hrs] 4. Real time clock interrupt (RTC): Explore the ISR of real-time clock tick interrupt (interrupt 8) of IBM-PC, enable and disable RTC tick by programming 8259 PIC. [4 hrs] 5. Mixed of experiments of previous topics. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The 8088/8086 memory and input/output interface, minimum-mode and maximum-mode operations.
Week 2	System clock, bus cycles, and time states.
Week 3	Hardware organization of memory address space.
Week 4	Memory devices and design of memory sub-systems.
Week 5	Handshaking, buffering, I/O read and write bus cycles.
Week 6	Design of isolated and memory-mapped I/O and port address decoding.
Week 7	(8255 PPI) internal architecture, port description, programming.
Week 8	(8255 PPI) modes of operation and interfacing with microprocessor.
Week 9	Programmable interval timer (8254 PIT) internal architecture, counters, programming.

Week 10	Programmable interval timer (8254 PIT) modes of operation, and Interfacing
Week 11	Vectored and prioritized interrupts, interrupt handling, interrupts service routine's structure.
Week 12	Software interrupt, internal interrupt, non-maskable interrupt, reset, external hardware interrupt.
Week 13	Programmable interrupt controller (8259 PIC) internal architecture and programming
Week 14	Programmable direct memory access controller (8237 DMA controller), programming and interfacing.
Week 15	Serial communications and programmable communication interface (8251 PCI) internal architecture, programming, and interfacing
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Interrupt function call (INT 21): Keyboard Input (function 1).
Week 2	Lab 2: Interrupt function call (INT 21): Display Output (function 2).
Week 3	Lab 3: Interrupt function call (INT 21): Print String (function 9)
Week 4	Lab 4: Interrupt function call (INT 21): Buffered Keyboard Input (function 0A)
Week 5	Lab 5: Interrupt function call (INT 10): Setting The cursor, Clear Screen.
Week 6	Lab 6: INT 21, function calls 9 & 0A: Using DOS to display ASCII characters set.
Week 7	Lab 7: Using mixed function calls to do the following: Clear screen, set curser, display prompt, name entered.
Week 8	Lab 8: Using mixed function calls to do the following: scroll & color screen, screen paging, and center & display name.
Week 9	Lab 9: Exploring the I/O subsystem of IBM PC: Programming 8253 PIT and 8255 PPI
Week 10	Lab 10: Control the speaker of the IBM PC.
Week 11	Lab 11: Exploring the Interrupt subsystem: Determine the starting address of an interrupt service routine (ISR), explore the code of an interrupt service routine, and execute different software interrupt service routines.
Week 12	Lab 12: Real time clock interrupt (RTC): Explore the ISR of real-time clock tick interrupt (interrupt 8) of IBM-PC.
Week 13	Lab 13: Enable and disable RTC tick by programming 8259 PIC.
Week 14	Lab 14: Mixed of experiments of previous topics.
Week 15	Lab 15: Mixed of experiments of previous topics.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	The 8088 and 8086 microprocessors Programming, Interfacing, Software, Hardware, and Applications, Fourth Edition, Walter A. Triebel and Avtar Singh	Yes
Recommended Texts	The intel microprocessors, Eighth Edition, BARRY B. BREY.	No
Websites	websites. Libraries sites in international universities.	

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	Numerical Analysis			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE321				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Musaab A. Alaziz		**e-mail**	mosab.adil@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE311	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The main objective of this course is to provide students with an introduction to the field of numerical analysis. Aside from developing competency in the topics and emphases listed above, the course aims to: further develop and apply problem solving skills through the introduction of numerical methods; provide a ground for applying knowledge acquired in previous mathematics courses; and give students an opportunity to develop and present an independent project. The course introduces the principles of: 1. Numerical solution of equations and systems of equations. 2. Solution of nonlinear equations, 3. Solution of linear systems, approximation of eigenvalues. 4. Interpolation and curve fitting. 5. Numerical integration and differentiation. 6. Numerical solution of ordinary differential equations
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Effectively write mathematical solutions and their interpretation in a clear and concise manner. 2. Locate and use information to numerically solve problems. 3. Work effectively with others to complete homework and class assignments. 4. Demonstrate ability to think critically by analyzing a practical problem and understanding the mathematical basis of the problem. 5. Demonstrate ability to think critically by developing and implementing algorithms to for solving application problems. 6. Demonstrate the ability to study the solution of a differential equation and develop a practical interpretation of the numerical results.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Preliminaries. [3 hrs] 2. SOLUTIONS OF NONLINEAR EQUATIONS . [6hrs] 3. SYSTEMS OF LINEAR EQUATIONS [6 hrs] 4. THE INTERPOLATING POLYNOMIAL [9 hrs] 5. NUMERICAL INTEGRATION AND DIFFERENTIATION . [9 hrs] 6. NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS. [9hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	78	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, 5 and 7
	Assignments	3	15% (10)	2, 6, 10	LO # 1, 3, 5 and 6
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 4, 5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Preliminaries, Basic concepts: round-off errors, floating point arithmetic, Convergence.
Week 2	**SOLUTIONS OF NONLINEAR EQUATIONS ,** Bracketing Methods, Bisection Method, Regula Falsi Method
Week 3	Fixed Point Methods. The Fixed-Point Problem, Newton's Method ,The Secant Method
Week 4	**SYSTEMS OF LINEAR EQUATIONS ,** Gaussian Elimination Method, LU-Decomposition Method
Week 5	Gauss-Seidel Method, Gauss-Jacobi Method
Week 6	**THE INTERPOLATING POLYNOMIAL.** The Lagrange Form of the Interpolating Polynomials. The Method of Undetermined Coefficients
Week 7	Divided Differences, Newton's forward-difference and backward-difference formulas,
Week 8	Error of Polynomial Interpolation , **Quiz 1**
Week 9	**NUMERICAL INTEGRATION AND DIFFERENTIATION ,** Numerical Differentiation Using the Interpolating Polynomial , Newton-Cotes Formulas
Week 10	Composite Rules for Numerical Integration ,Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule

Week 11	Romberg Integration, Gaussian Integration, Errors of Quadrature Formulas
Week 12	**Midterm**
Week 13	**NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS ,** One-Step Method, Euler's Method, Taylor's Series Methods of Order k,
Week 14	Runge-Kutta Methods , **Quiz 2**
Week 15	Linear Multi-Step Methods, Adams' Method as Predictor-corrector methods , Milne's Method
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Burden, Richard L. and Faires, J. Douglas, *Numerical Analysis*, Boston, MA : Brooks/Cole, Cengage Learning, 2011. • Chapra, Steven C. and Canale, Raymond P., *Numerical Methods for Engineers,* Boston : McGraw-Hill Higher Education 2010.	Yes
Recommended Texts	Kadhum Al-lami, "Introductory Methods of Numerical Analysis"	Yes
Websites	websites. Libraries sites in international universities.	

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	Control Systems			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE413				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		4	**Semester of Delivery**		7
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Loai Ali Talib		**e-mail**	loai.talib@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE 213	**Semester**	3
Co-requisites module	Pre-calculus	**Semester**	1

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in control engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of control engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of control engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A. Knowledge and Understanding A1- Clarify the basic concepts of control systems and their applications in industrial fields. A2- Acquiring skill in dealing with problems and dealing with them through control systems. A3- Acquiring basic skills for the control industry. A4- Acquiring experience in industrial computer systems. A5- Designing programmed home control systems. B. Subject-specific skills B1 - The ability to design simple and advanced control systems. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing data.
Indicative Contents المحتويات الإرشادية	1. Mathematical models of control systems, Transfer functions and block diagrams. [12 hrs] 2. Time-domain responses. [9 hrs] 3. Stability Analysis. [12 hrs] 4. State space analysis. [9 hrs] 5. Digital Control Systems. [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects.

	4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.133
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, 5 and 7
	Assignments	3	15% (10)	2, 6, 10	LO # 1, 3, 5 and 6
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 4, 5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Mathematical models for electrical and mechanical systems.
Week 2	Simple spring- dash-pot system and DC servomotor.
Week 3	Transfer function, block diagram representation.
Week 4	Signal flow graph and Mason's formula.
Week 5	Time response of first order system.

Week 6	Time response of second order system.
Week 7	Transient response and steady state error.
Week 8	Stability analysis by Routh- Hurwitz criterion.
Week 9	Root locus plot.
Week 10	Frequency response method.
Week 11	Nyquist criterion a Bode plot techniques.
Week 12	State space model from differential equation, standard form.
Week 13	Solution of state equation, state transition matrix.
Week 14	Controllability test, observability test.
Week 15	Introduction to digital control systems, pulse transfer function.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Modem Control Engineering, K. Ogata.	Yes
Recommended Texts	Advance Control Engineering, R. S. Burns	Yes
Websites	websites. Libraries sites in international universities.	

Grading Scheme
مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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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	Embedded Computing Systems			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE411				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		4	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Hassanin S. Al-Fahaam		**e-mail**	hassanin.husein@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE322	**Semester**	6
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarify the concepts associated with real time system regarding resource management. 2. Clarify the requirements to establish a real time project using embedded system 3. Acquire the basic skills for synchronizing the process in foreground and background aspects. 4. Acquire basic skills for interfacing, Synchronous serial interface and I/O programming. 5. Acquiring the skills to Analog to digital conversion, Real-time data acquisition, Digital to analog conversion 6. Gain the skills required to build a networked embedded system, Reentrant programming, Critical section, Network topologies.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A: (Theoretical and Tutorial Hours)</u> 1. Introduction to embedded systems: Indicate some reasons for studying embedded systems, Product life cycle, Quality design, Debugging, Computers, processors, memory, and microcontrollers, Digital logic and open collector, Types of real-time systems. [5 hrs] 2. Embedded ARM microcontrollers: ARM processor architecture, Software model, Addressing modes, programming instructions, Fundamental concepts of assembly language and linking: labels, address management. [5 hrs] 3. Microcontroller Hardware: Microcontroller I/O pins, I/O programming and the direction register, Phased-lock loop, SysTick timer, Measurement of dynamic efficiency, Power management, Fault tolerant system. [5 hrs]

	4. Real-time operating systems: Fundamentals, Foreground/Background, Delay tasks, Round Robin scheduler, Semaphores, Thread synchronization or rendezvous, Resource sharing, non-reentrant code or mutual exclusion, Thread communication using: mailbox and FIFO queue, Switch debouncing, Deadlocks, Monitors, Free RTOS. [10 hrs] 5. Interfacing and Communication: Introduction to interfacing, , Synchronous serial interface SSI, LCD interface, Scanned keyboard, Actuators, Pulse width modulation, Motors drivers, I2C interface, USB interface, High speed interfacing: Hardware FIFO, Dual-port memory, DMA controllers sensors interface. [5 hrs] 6. Interrupt programming and real-time systems: I/O synchronization, Interrupt concepts, Polled I/O vs. interrupt-driven I/O, NVIC on ARM processor, SysTick periodic interrupts, Timer periodic interrupt, Ballast code timing, Multithreading. [5 hrs] 7. Analog I/O Interfacing: Analog to digital conversion, Real-time data acquisition, Digital to analog conversion, 4~20mA signal standards. [5 hrs] 8. High speed networks: Fundamentals, CAN, Ethernet, Internet of Things. [5 hrs] <u>Part B: (Lab Hours)</u> 1. Getting Started with Microcontroller. [2 hrs] 2. The Basic Functions in Microcontroller. [4 hrs] 3. Using Sensors with the Microcontroller. [4 hrs] 4. Electromechanical Control Using the Microcontroller. [4 hrs] 5. Wireless Control Using the Microcontroller. [4 hrs] 6. PM2.5/Air Quality Monitor Using Microcontroller. [4 hrs] 7. A Fire-Fighting Robot Using Microcontroller. [4 hrs] 8. Intelligent Lock System Using Microcontroller. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1-4 and 5
	Assignments	2	10% (10)	3, 13	LO # 1-4 and 5
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 1-4 and 5
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-6
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Indicate some reasons for studying embedded systems, Product life cycle, Quality design, Debugging, Computers, processors, memory, and microcontrollers.
Week 2	Digital logic and open collector, of real-time systems Types.
Week 3	ARM processor architecture.
Week 4	Software model, Addressing modes, programming instructions.

Week 5	Fundamental concepts of assembly language and linking: labels, address management.
Week 6	Microcontroller I/O pins.
Week 7	, I/O programming and the direction register, Phased-lock loop, SysTick timer, Measurement of dynamic efficiency, Power management, Fault tolerant system.
Week 8	Fundamentals, Foreground/Background, Delay tasks, Round Robin scheduler, Semaphores, Thread synchronization or rendezvous.
Week 9	Resource sharing, non-reentrant code or mutual exclusion.
Week 10	Thread communication using: mailbox and FIFO queue, Switch debouncing, Deadlocks, Monitors, Free RTOS.
Week 11	Introduction to interfacing, , Synchronous serial interface SSI, LCD interface, Scanned keyboard, Actuators, Pulse width modulation, Motors drivers, I2C interface.
Week 12	USB interface, High speed interfacing: Hardware FIFO, Dual-port memory, DMA controllers sensors interface.
Week 13	I/O synchronization, Interrupt concepts, Polled I/O vs. interrupt-driven I/O, NVIC on ARM processor, SysTick periodic interrupts, Timer periodic interrupt, Ballast code timing, Multithreading.
Week 14	Analog to digital conversion, Real-time data acquisition, Digital to analog conversion, 4~20mA signal standards.
Week 15	Fundamentals, CAN, Ethernet, Internet of Things.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab. 1: Getting Started with Microcontroller.
Week 2	Lab. 2: The Basic Functions in Microcontroller Part1.
Week 3	Lab. 3: The Basic Functions in Microcontroller Part2.
Week 4	Lab. 4: Using Sensors with the Microcontroller Part1.
Week 5	Lab. 5: Using Sensors with the Microcontroller Part2.
Week 6	Lab. 6: Electromechanical Control Using the Microcontroller Part1.
Week 7	Lab. 7: Electromechanical Control Using the Microcontroller Part2.
Week 8	Lab. 8: Wireless Control Using the Microcontroller Part1.
Week 9	Lab. 9: Wireless Control Using the Microcontroller Part2.
Week 10	Lab. 10: PM2.5/Air Quality Monitor Using Microcontroller Part1.
Week 11	Lab. 11: PM2.5/Air Quality Monitor Using Microcontroller Part2.

Week 12	Lab. 12: A Fire-Fighting Robot Using Microcontroller Part1.
Week 13	Lab. 13: A Fire-Fighting Robot Using Microcontroller Part2.
Week 14	Lab. 14: Intelligent Lock System Using Microcontroller Part1.
Week 15	Lab. 15: Intelligent Lock System Using Microcontroller Part2.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Making Embedded Systems: Design Patterns for Great Software Book by Elecia White	No
Recommended Texts	Embedded System Design Book by P. Marwedel and Peter Marwede	No
Websites	websites. Libraries sites in international universities.	

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 Network**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CoE412**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	7		**Semester of Delivery**	1	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	Dr. Abbas A. Jasim		**e-mail**	Abbas.jasim@buog.edu.iq	
Module Leader's Acad. Title	Assistance Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE324	**Semester**	6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Introduction to the design and performance analysis of computer networks Architectures, protocols, standards and technologies of computer networks. Including different computer networks types, media, models, switching, retransmission, flow and error control.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- obtain the ability of networking Principles. 2- obtain the ability of connecting L=local Area networks 3- ability of evaluating networks. 4- obtain the ability of determining LAN network requirements 5- the Retransmission techniques. 6. Media access control. 7- The ability to analyze flow and error control. 8- The ability to design a network for a given purpose. 9- The ability to write technical reports in computer network.
Indicative Contents المحتويات الإرشادية	content includes the following. 1. Introduction and overview: General definition, fundamental concepts of network, reasons for studying networks, type of nodes, types of computers (LANs, MANs, WANs), Network Criteria (performance, reliability, and security), hardware and software components of networks , network types (LAN, WAN, MAN, and wireless),and Network line configuration (point-to-point, multipoint). 2. Network Topologies (mesh, star, tree, bus, ring), LAN Network Models (client/server and peer to peer). 3. Network architecture: Protocol suits and layering concepts, OSI reference models, Connection-oriented and connectionless services. 4. Flow and Error Control: ARQ system utilization of networks: stop and wait protocol and Sliding Window, Go back N and selective repeat protocols. Error detection techniques.

	5. Media Access Control: Random access, control access, CSMA, Reservation, Polling, token ring, Channelization. 6. LAN and WAN technologies: Ethernet, token Ring, Gigabit Ethernet, network evaluation, efficiency, capacity. 7. Network and internetworking devices: as repeaters, bridges, switches, routers, and gateways. 8. Switching techniques and communication services: Circuit and packet switching. 9. Wireless network: wireless standards, wireless LANs, ESS and BSS, Distribution.

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 network thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 7 and 8
	Assignments	2	10% (10)	2, 12	LO # 3, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 4, 5 and 9
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamental concepts of network
Week 2	types of computers networks
Week 3	LANs, MANs, WANs
Week 4	Network architecture
Week 5	Protocol suits and layering concepts
Week 6	OSI and TCP/IP reference models
Week 7	Retransmission techniques: ARQ system utilization of networks
Week 8	Stop and wait protocol, Goback N and selective repeat protocols.
Week 9	Switching techniques and communication services
Week 10	Circuit and packet switching, broad cast method,
Week 11	types of communication services: connection and connectionless service
Week 12	Local Area Networks Technology: ALOHA (pure and slotted),
Week 13	Ethernet (CSMA/CD), Token ring, and Token bus.
Week 14	Network Devices
Week 15	Network Evaluation and performance
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Local Area Networks
Week 2	Lab 1: Introduction to Local Area Networks
Week 3	Lab 2: Cabling and connectors
Week 4	Lab 3: Connecting LAN
Week 5	Lab 4: Connecting LAN (continued)
Week 6	Lab 5: Workgroup and File Sharing
Week 7	Lab 6: LAN Expanding
Week 8	Lab 6: LAN Expanding
Week 9	Lab 7: LAN settings
Week 10	Lab 7: LAN settings
Week 11	Lab 7: LAN settings
Week 12	Lab 8: Network Devices
Week 13	Lab 8: Network Devices
Week 14	Lab 9: LAN Testing.
Week 15	Lab 9: LAN Testing.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Data Communication and Networks (2007) by B. Forouzan	
Recommended Texts	Local Area Networks (2003) by B. Forouzan	
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	Image processing			**Module Delivery**	
Module Type	Elective			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE415				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		4	**Semester of Delivery**		1
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	Ali A. Abed		**e-mail**	ali.abed@uobasrah.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE326	**Semester**	6
Co-requisites module	CoE222, CoE311	**Semester**	4, 5

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Understanding the principles and mathematics of several techniques and algorithms needed in the field of image processing and computer vision. Programming these methods and algorithms with some languages (e.g. MATLAB or Python) to enhance practical capabilities. Best practicing the theoretical concepts through the lab and implementation of small class projects to facilitate students skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Expanded coverage of the fundamentals of spatial filtering. 2. A more comprehensive and cohesive coverage of image transforms. 3. A more complete focus on edge detection. 4. A discussion of clustering, super pixels, and their use in region segmentation. 5. Coverage of maximally stable extremal regions. 6. Ready to learn feature extraction methods such as SIFT. 7. Ready to learn machine learning and deep learning in computer vision.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part (A): Chapter 1: Introduction and fundamentals 1. What is DIP? Definitions and applications (1hrs). 2. Components of an image processing system (1hrs) 3. Visual perception (2hrs) 4. Image sensing, sampling, and quantization (2hrs) 5. Basic mathematical tools (2hrs). Chapter 2: Intensity transformation and filtering (ITF) 1. Basic ITF functions (1hrs). 2. Histogram processing and spatial filtering (3hrs). 3. Smoothing and sharpening filters (3hrs). Chapter 3: Frequency domain filtering 1. Fourier transform (2hrs). 2. DFT, 2-D DFT, and IDFT (3hrs). 3. FFT (2hrs). Chapter 4: Image restoration and reconstruction 1. Process model (2hrs). 2. Noise models (2hrs). 3. Inverse and wiener filtering (2hrs). 4. Image reconstruction from projection (2hrs). 5. Color transformation and compression (2hrs). Chapter 5: Image transforms 1. Matrix-based transforms (1hrs).

	2. Walsh-Hadamard transforms (1hrs) 3. Haar transforms (2hrs) 4. Wavelet transforms (3hrs) Chapter 6: Image compression and watermarking 1. Huffman coding (2hrs) 2. Block transform coding (2hrs) 3. Wavelet coding (2hrs) 4. Watermarking (2hrs) Chapter 7: Morphological image processing 1. Erosion and dilation (2hrs) 2. Some basic algorithms (3hrs) 3. Morphological reconstruction (2hrs) Chapter 8: Image segmentation 1. Point, line, edge detection (2hrs). 2. Thresholding and merging (2hrs). 3. Clustering and graph cuts (3hrs). Part (B): Laboratory (MATLAB or Python) 1. Display of an Image, Negative of an Image (Binary & Gray Scale) (2hrs). 2. Implementation of Relationships between Pixels (2hrs). 3. Implementation of Transformations of an Image (2hrs). 4. Stretching of a low contrast image, Histogram, and Histogram Equalization (4hrs). 5. Display of bit planes of an Image (2hrs). 6. Display of FFT (1-D & 2-D) of an image (2hrs). 7. Image Mean, Standard Deviation, and Correlation coefficient (2hrs). 8. Image Smoothening Filters (Mean and Median filtering of an Image) (2hrs). 9. Image sharpening filters and Edge Detection using Gradient Filters (4hrs). 10. Image Compression by DCT, DPCM, HUFFMAN coding (2hrs). 11. Implementation of image restoring techniques (2hrs). 12. Implementation of Image Intensity slicing for image enhancement (2hrs). 13. Canny edge detection Algorithm (2hrs).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small simulation projects. 4. Class projects. 5. Short tests (quizzes). 6. Lab.

	7. Mid-terms and final exams

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3 and 4,5,6,7
	Assignments	2	10% (10)	3, 13	LO #1, 2, 3 and 4,5,6,7
	Lab.	1	15% (15)	Continuous	
	Class Project	1	5% (5)	13	LO # 1, 2,3 and 4,5,6,7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-5
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	What is DIP? Definitions and applications, Components of an image processing system.
Week 2	Visual perception, Image sensing, sampling, and quantization, Basic mathematical tools.
Week 3	Basic ITF functions, Histogram processing and spatial filtering, Smoothing and sharpening filters.
Week 4	Fourier transform, DFT, 2-D DFT, IDFT, FFT.
Week 5	Process model, Noise models, Inverse and wiener filtering.
Week 6	Image reconstruction from projection, Color transformation and compression.
Week 7	Matrix-based transforms, Walsh-Hadamard transforms.
Week 8	Haar transforms, Wavelet transforms.

Week 9	Huffman coding, Block transform coding.
Week 10	Wavelet coding, Watermarking.
Week 11	Erosion and dilation, Some basic algorithms.
Week 12	Morphological reconstruction
Week 13	Point, line, edge detection, Thresholding and merging.
Week 14	Clustering and graph cuts
Week 15	**Preparatory week before the final Exam**
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Digital Image Processing, Fourth Edition, Rafael C. Gonzalez and Richard E. Woods. https://dl.icdst.org/pdfs/files4/01c56e081202b62bd7d3b4f8545775fb.pdf	No
Recommended Texts		
Websites	websites. Libraries sites in international universities.	

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	Project Management			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE414				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		4	**Semester of Delivery**		7
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Ali Essam Hameed		**e-mail**	ali.haddad@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
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	This course is intended as an introduction to the different concepts, skills, tools, and techniques needed to successfully manage projects of various types and sizes, with focus on projects involving Computer Engineering. Course material covers the approaches and practices in project management over the life cycle of the project. This course is highly interactive, with hands-on, in-class practice projects and analysis of real-world project examples. While providing the knowledge needed for project planning, monitoring, and control, it focuses on the development of leadership, teamwork, and problem solving skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Project, program, portfolio, and operations management. 2. Systems view of project management. 3. Organizations. 4. Project and product life cycles. 5. Project management process groups. 6. Using Microsoft Project Professional software. 7. Project management knowledge areas.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Management literature [6 hrs] 2. Systems philosophy [2 hrs] 3. Organizational politics [2 hrs] 4. Types of life cycles [4 hrs] 5. Process-phase-knowledge area association [2 hrs] 6. Software management tools [4 hrs] 7. Knowledge area literature [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification through class lectures. 2. Homework assignments 3. Project. 3. Short tests (quizzes). 4. Mid-term. 5. Final exam.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	43	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.866
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	4, 12	LO #1, LO #7
	Assignments	3	15% (15)	2, 6, 10	LO #1, LO #2/3, LO #5
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	14	LO #6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	8	LO # 1-4
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Project: Attributes, Constraints
Week 2	Project management: The ten knowledge areas, Project success
Week 3	Program management, Portfolio management
Week 4	Systems view of project management: Systems approach, The three-sphere model
Week 5	Organizations: The four frames, Organizational structures, Organizational culture
Week 6	Project life cycle: Types
Week 7	Operations management, Product life cycle: Types
Week 8	Project management processes, The five process groups
Week 9	Microsoft Project Professional software: Introduction

Week 10	Microsoft Project Professional software: Case study
Week 11	Project integration management: Main processes, Project charter, Project management plan
Week 12	Project Scope management: Work breakdown structure
Week 13	Project schedule management: Network diagram, Dependency, Critical path method, Program evaluation and review technique
Week 14	Project resource management: Resource histogram, Resource leveling
Week 15	Project risk management: Probability/impact matrix and chart, Decision tree
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	K. Schwalbe, "Information Technology Project Management", 9th ed., 2019	
Recommended Texts	"A Guide to the Project Management Body of Knowledge (PMBOK Guide)", 6th ed., 2017	
Websites	"Microsoft Project Professional", https://www.microsoft.com/en-ww/microsoft-365/project/project-management-software	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Parallel Processing Architecture			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE424				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		4	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	Fatemah K. Al-Assfor		**e-mail**	Fatmah.hassan@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE312	**Semesters**	5
Co-requisites module		**Semesters**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Learn the fundamental and newly developing hardware and software topics in parallel computer architecture (PCA), including concepts, models, methods, metrics, systems, and applications. 2. Learn Parallel computing (taking advantage of parallelism in computing) which becomes one of the most challenging and important areas of Computer Engineering. 3. Identify the conditions of parallelism, and study different parallel interconnection systems. 4. Focuses on identifying the pipeline hazards, gain in-depth knowledge of architecture and learn parallel processing and its applications to solve workloads.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Students will gain fundamental knowledge and understanding of principles in parallel computer architecture and computing, emphasizing the hardware challenges. 2. Analyze the parallelism. 3. Identify the conditions of parallelism. 4. Study different parallel interconnection systems. 5. Identify the memory types in parallel processing systems. 6. Understanding pipelined and non-pipelined processing. 7. Identify the pipeline system and pipeline hazards. 8. Gain in-depth knowledge of parallel computer architecture. 9. Learn parallel processing and its applications to solve workloads.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Theoretical and Tutorial Hours</u> 1. Necessity of high performance, constraints of conventional architecture, Von Neuman architecture, IAS computer, limitations, evolution of parallel processors. [3 hrs] 2. Enhancing Uniprocessor performance, parallel processing mechanisms, multiple function units, features of parallel processing, parallelism and pipelining within CPU, overlapped CPU, use of memory hierarchy system. [3 hrs] 3. Architectural Classifications of parallel computers: Flynn's classifications (SISD, SIMD, MISD, and MIMD) computer organizations, classification based on computing between processing elements, SIMD. [3 hrs] 4. Memory architecture of Parallel Processing: shared (tightly coupled) memory, distributed (loosely coupled) memory, UMA and NUMA, Distributed-Shared Memory. [3 hrs] 5. Multiprocessor Architecture: multiprocessor systems, multicore, thread and multi-thread, Shared-memory processors, Distributed-memory multiprocessor. [3 hrs]

	6. Interconnection- bus architecture, processor communication networks (time shared buses, crossbar switches). [3 hrs] 7. SIMD architectures: vector Processor, basic vector architecture, array processors (systolic array, wave front array) matrix multiplication. [6 hrs] 8. Pipeline Mechanism: instruction pipelining, multiple function units, Types of hazards, hazards handling and reducing, role of cache memory on pipeline system, pipeline speedup, efficiency, throughput, branch handling Techniques, superscalar system. [9 hrs] 9. Interconnection Networks: static versus dynamic SIMD networks, network performance factors, static networks (linear, tree, torus, cube, hypercube, mesh, ring). Dynamic interconnection networks; switches versus links, single stage interconnection network (shuffle exchange), multistage interconnection networks MIN (perfect shuffle, inverse shuffle, bit reversal, and butterfly) Omega MIN, other MINs. [12 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	78	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to parallel processing architecture:** Necessity of high performance, uniprocessor conventional architecture, Von Neuman architecture, IAS computer.
Week 2	Evolution of parallel processors. Enhancing Uniprocessor performance, parallel processing mechanisms, multiple function units, features of parallel processing, parallelism and pipelining within CPU, overlapped CPU, use of memory hierarchy system.
Week 3	Architectural Classifications of parallel computers: Flynn's classifications (SISD, SIMD, MISD, and MIMD) computer organizations, classification based on computing between processing elements, SIMD.
Week 4	Memory architecture of Parallel Processing: shared (tightly coupled) memory, distributed (loosely coupled) memory, UMA and NUMA, Distributed-Shared Memory.
Week 5	Multiprocessor Architecture: multiprocessor systems, multicore, thread and multi-thread, Shared-memory processors, Distributed-memory multiprocessor.
Week 6	Interconnection- bus architecture, processor communication networks (time shared buses, crossbar switches).
Week 7	SIMD architectures: vector Processor, basic vector architecture.
Week 8	Array processors (systolic array, wave front array) matrix multiplication.
Week 9	Pipeline Mechanism: instruction pipelining, multiple function units, Types of hazards: data, structural & control, structural. hazards handling and reducing.
Week 10	Role of cache memory on pipeline system, pipeline speedup, efficiency, throughput, Branch Handling Techniques.
Week 11	Superscalar system. Interconnection Networks: static versus dynamic SIMD networks, network performance factors.

Week 12	Static networks (linear, tree, torus, cube, hypercube, mesh, ring).
Week 13	Dynamic interconnection networks; switches versus links, single stage interconnection network (shuffle exchange), multistage interconnection networks MIN: perfect shuffle, inverse shuffle, bit reversal, and butterfly.
Week 14	Techniques of routing messages: Destination tag and XOR tag, Omega network with (2X2) switches
Week 15	(4X4) switches, high order omega network, other MINs.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Digital Logic and Microcomputer Design, M. RAFIQUZZAMAN	yes
Recommended Texts		

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	Discrete Control Systems			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE425				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		4	**Semester of Delivery**		8
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Loai Ali Talib		**e-mail**	Loai.talib@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE413	**Semester**	7
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The objective of this course is to introduce the students to the fundamental principles of discrete time control system. Introduction to discrete time control system, z transforms and inverse z transform, impulse sampling and data hold, pulse transfer function, time response and frequency response are studied. The performance of systems and the stability analysis will also be introduced.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Knowledge and Understanding A1- Clarify the basic concepts of discrete time control system. A2- Gaining experience in developing and analyzing mathematical models for different systems. A3- Studying the response and accuracy of systems. A4- Study methods for testing the stability and accuracy of systems. B. Subject-specific skills B1- Learn about discrete time control systems. B2- Identify the basic components of the system and their mathematical models. B3- The ability to address questions of the form of the response. B4- Identifying the mode of operation of discrete time control systems and ways to determine the stability of the systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A: (Theoretical and Tutorial Hours)** Introduction to discrete time control system. [3 hrs] Fundamental of discrete time control system. [6 hrs] Time response and frequency response. [6 hrs] Modeling of discrete time control system. [6 hrs] Analysis of discrete time control system. [3 hrs] Realization of digital controller. [3 hrs] Stability analysis of discrete time control system. [6 hrs] Steady state error analysis of discrete time control system. [3 hrs] Root locus diagram of discrete time system. [6 hrs] State space analysis of discrete time system. [3 hrs] **Part B: (PLC Lab Hours)** Introduction: (2h) Introduction to PLC: Control Elements, Definition of PLC, Standards and Characteristics of PLC, Selection and Application of PLC. The Structure of PLC: Hardware Structure, Input and Output Structure of PLC. Software Structure. Programming:(2h) Programming Tool (GMWIN): Launching GMWIN, User Interface, Project Structure, LD Edit, Upload, Menu, Toolbar, Files Created by GMWIN, Opening Files, Saving Files. Execution: Scan Time, I/O Refresh I/O Image Area, Operation Mode Changing the Operation Mode, Restart Mode. Programming Basics: Using the Toolbar, Sequence Operators, List of Functions, and List of Function Blocks. Basic Sequence Circuits: (2h)

	AND Circuit, OR Circuit, NOT Circuit, Self-Holding Circuit, Interlock Circuit, On-Delay Circuit, Off-Delay Circuit, One Shot Circuit. Exercise 1-2: (2h) PLC I/0 Program Practice, Practice using Subroutine Commands Program. Exercise3-4:(2h) Motor's Start/Stop Circuit Program Practice., Motor's Forward/Reverse Control Program Practice, Position Control Program Practice. Exercise 5-6(2h) Program Practice using SET & RESET, Positive/Negative Transition Sensing Pulse Coil Program. Exercise 7-8-9-10 (2h) Program Practice using Counter (UP), Program Practice using Branch JUMP Command, Program Practice using Return Command, and Program Practice using Transmission (MOVE) Command. Exercise 11-12 (2h) Motor's Upper/Lower Limit Linear Movement Circuit, Stepping Motor Circuit Practice using Timer. Exercise 13 (2h): A/D, D/A Converter. Exercise 14(2h): Temperature Sensor Module Application Program Practice. Exercise 15(2h): Photo Control SCR Circuit application Program Practice. Exercise 15-16 (2h): (Random Quiz Program Practice), (Electronic Timer Program Practice). Exercise 17-18 (2h): (Lamp Shift Lighting Program Practice), (Timer External Control Program Practice) Exercise 19-20-21(2h): (Timer External Control Program Practice), (Die Program Practice), (ONE-SHOT Circuit Practice using TP Exercise 31 (2h): Phase Induction Motor's Y-△ Start Circuit Program.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	Midterm Exam	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, definition, concept of discrete time control, structure.
Week 2	Z- transform and inverse z – transform, solving difference equation, examples.
Week 3	Time response of discrete time system, convolution summation, frequency response.
Week 4	Introduction, basic structure, ADC and DAC, concept of sampling and sample. hold device, transfer function of ZOH and z- transfer function.
Week 5	Effect of sampler on the z-transfer function, z transfer function of cascaded elements, examples.
Week 6	Pulse transfer function of closed loop discrete time system Different configuration, examples.
Week 7	Block diagram realization of digital controller, direct programming, standard programming.
Week 8	Basic concept, mapping between the s-plane and the z- plane, stability analysis of closed loop discrete time system, examples.
Week 9	Methods of testing stability, The Jury stability test, bilinear transformation and Routh criterion, examples.
Week 10	Transient response of discrete time system, transient response specifications.
Week 11	Steady state error in closed loop discrete time system, types of system, examples.
Week 12	Root locus in z- plane, general rules for constructing root loci.
Week 13	Different examples on root locus plot.
Week 14	Introduction, definitions, state space representation of discrete time systems, solving state equation, state transition matrix.
Week 15	Solving state equation, z-transfer function matrix, Controllability and observability test, introduction to State feedback.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	• **Introduction to PLC:** Control Elements, Definition of PLC, Standards and Characteristics of PLC, Selection and Application of PLC. • **The Structure of PLC:** Hardware Structure, Input and Output Structure of PLC. Software Structure. • The student examines the PLC components and discovers the various PLC modules and prepares the student for developing programs to perform various simple applications for these modules
Week 2	**Programming** • **Programming Tool (GMWIN):** Launching GMWIN, User Interface, Project Structure, LD Edit, Upload, Menu, Toolbar, Files Created by GMWIN, Opening Files, Saving Files. • **Execution:** Scan Time, I/O Refresh I/O Image Area, Operation Mode Changing the Operation Mode, Restart Mode. • **Programming Basics:** Using the Toolbar, Sequence Operators, List of Functions, and List of Function Blocks.
Week 3	**Basic Sequence Circuits**: AND Circuit, OR Circuit, NOT Circuit, Self-Holding Circuit, Interlock Circuit, On-Delay Circuit, Off-Delay Circuit, One Shot Circuit.
Week 4	**Exercise 1-2:** PLC I/0 Program Practice, Practice using Subroutine Commands Program.
Week 5	**Exercise3-4:** Motor's Start/Stop Circuit Program Practice., Motor's Forward/Reverse Control Program Practice, Position Control Program Practice.
Week 6	**Exercise 5 -6:** Program Practice using SET & RESET, Positive/Negative Transition Sensing Pulse Coil Program.
Week 7	**Exercise 7-8-9-10**: Program Practice using Counter (UP), Program Practice using Branch JUMP Command, Program Practice using Return Command, and Program Practice using Transmission (MOVE) Command
Week 8	**Exercise 11-12:** Motor's Upper/Lower Limit Linear Movement Circuit, Stepping Motor Circuit Practice using Timer.
Week 9	**Exercise 13:** A/D, D/A Converter.
Week 10	**Exercise 14:** Temperature Sensor Module Application Program Practice.
Week 11	**Exercise 15:** Photo Control SCR Circuit application Program Practice.
Week 12	**Exercise 15-16 :(** Random Quiz Program Practice), (Electronic Timer Program Practice).
Week 13	**Exercise 17-18:** (Lamp Shift Lighting Program Practice), (Timer External Control Program Practice)
Week 14	**Exercise 19-20-21:** (Timer External Control Program Practice), (Die Program Practice) , (ONE-SHOT Circuit Practice using TP.
Week 15	Phase Induction Motor's Y-△ Start Circuit Program.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Discrete-Time Control Systems, Katsuhiko Ogata	Yes
Recommended Texts	Digital Control System Analysis & Design, Charles L. Phillips	No
Websites	websites. Libraries sites in international universities.	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	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	**Network Technology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CoE423**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	8		**Semester of Delivery**	2	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	Dr. Abbas A. Jasim		**e-mail**	Abbas.jasim@buog.edu.iq	
Module Leader's Acad. Title	Assistance Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer Network	**Semester**	7
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- The concepts of internetworking 2- internetwork architecture, protocols 3- network services and applications. 4- Server based operation. 5- Networking problem notification and control. 6- Authentication and security issues principles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the ability of network problem solving. 2. Obtain the ability of connecting networks Knowledge. 3. Obtain the ability of analyzing networks. 4. the ability of estimating network requirements. 5. The ability to deal with information systems. 6. The ability to analyze different problems in the network and problems fixing. 7. The ability to design a network for a given purpose. 8. The ability to write technical reports.
Indicative Contents المحتويات الإرشادية	content includes the following. 1. Internetworking Protocol suites (TCP/IP), protocols stack, functions and layers. 2. **Internet addressing:** Logical addressing, classful and classless addressing, subnetting, and address translation. 3. **Networking Protocol:** IPv4, IPv6, Packetizing, datagram and virtual circuit networks, network services, fragmentation. 4. **Network supporting protocols:** Address mapping ARP, RARP, BOOTP, DHCP, error reporting ICMP. Multicasting IGMP. Routing concepts. 5. **Process- to- Process delivery protocols:** Connectionless and Connection-Oriented Service, transport control protocol TCP, user datagram protocol UDP, stream transfer control protocol SCTP, Multi homing. 6. **Application-Level Protocols:** Telnet, FTP, TFTP, NFS, SMTP, LPD, X Window, SNMP, DNS. 7. **Network Congestion:** packet switching network congestion, Open-loop congestion control, and Closed-loop congestion control.

	8. **Client-server computing:** Web technologies: Server-side programs; common gateway interface (CGI), applet concept, HTTP, client-server relationship, Uniform Resource Locator, scripts. 9. **Network Security Concepts:** Authentication, Encryption and decryption, cryptography, Public key, private key, symmetric key, filtering.

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 network thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Internet protocols
Week 2	Internet protocols Addressing
Week 3	Address mapping
Week 4	Subnetting and Supernetting
Week 5	Internet protocols and Transport protocols
Week 6	Computer network routing: Routing Algorithms
Week 7	Routing tables (for datagram and virtual circuit network)
Week 8	routing strategies (flooding, spanning tree, static routing, and Hierarchical routing)
Week 9	Routing protocols RIP, OSPF
Week 10	TCP/IP Transport Protocols
Week 11	TCP/IP Application Protocols
Week 12	Congestion control strategies
Week 13	Close loop and open loop congestion control
Week 14	Quality of Services
Week 15	Network security Priciples
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Internetworking
Week 2	Lab 2: IP Network Setting
Week 3	Lab 3: Router
Week 4	Lab 4: DHCP configuration
Week 5	Lab 5: Wireless Networks

Week 6	Lab 6: Internet Diagnostic
Week 7	Lab 7: Client- Server Networks
Week 8	Lab 8: Server Setting
Week 9	Lab 9: Active Directory
Week 10	Lab 10: Subnetting
Week 11	Lab 11: Network Simulator Introduction- CISCO
Week 12	Lab 12: Network Simulator – Routing Table
Week 13	Lab 13: Network Simulator – Routing

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Data Communication and Networks (2007) by B. Forouzan	Yes
Recommended Texts	Local Area Networks (2003) by B. Forouzan	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	Information Security			**Module Delivery**	
Module Type	Elective			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE421				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	Ali A. Abed		**e-mail**	ali.abed@uobasrah.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CoE412	**Semester**	7
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To broaden knowledge of security concepts and practices. 2. To demonstrate the expertise as a seasoned security professional. 3. To make students more marketable in a competitive workforce. 4. To make students be eligible for more employment opportunities. 5. To bring improved security expertise to the student's future occupation 6. To show a dedication to the security discipline. 7. Introducing software programs for running some attack implementation to enhance practical capabilities. 8. Best practicing the theoretical concepts through the implementation of small class projects to facilitate students skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learning the security and risk management 2. Learning the asset security 3. Learning security engineering and cryptography 4. Learning security in communication networks 5. Learning the identity and access management 6. Learning how to satisfy security assessment and testing 7. Learning some security operations 8. Learning how to realize security in the developed software.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1: Security and risk management (5hrs) 1. Availability, integrity, confidentiality and control types 2. Security frameworks and cybercrimes 3. Intellectual property laws 4. Privacy 5. Risk management and threat modeling 6. Risk assessment and analysis 7. Risk management frameworks and personal security 8. Security governance Chapter 2: Asset security (3hrs) 1. Information life cycle and classification 2. Layers of responsibilities 3. Retention policies 4. Protecting privacy Chapter 3: Security engineering (4hrs) 1. Architecture and operating systems 2. Security models 3. Certification vs. accreditation

	4. Distributed system security 5. Cryptography and ciphering 6. Methods of encryption 7. Attacks on cryptography 8. Protecting assets Chapter 4: Communication and network security (3hrs) 1. OSI model and TCP/IP model 2. Transmission and cabling 3. Networking devices and types of networks 4. Network encryption and attacks Chapter 5: Identity and access management (4hrs) 1. Identification, authentication, authorization 2. Access control models and techniques 3. Access control admin and methods 4. Intrusion detection and prevention 5. Threats to access control Chapter 6: Security assessment and testing (3hrs) 1. Vulnerability and penetration testing 2. Auditing admin control Chapter 7: Security operations (4hrs) 1. Admin and configuration management 2. Physical security and provisioning 3. Network and resource availability 4. Preventative measures 5. Incident management process and disaster recovery Chapter 8: Software development security (4hrs) 1. Building good code 2. Where does security place? 3. Secure software development 4. DevOps 5. Mobile code and web security 6. Malicious software (Malware)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small simulation projects. 4. Class projects. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.53
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3 and 4,5,6,7,8
	Assignments	2	10% (10)	3, 13	LO #1, 2, 3 and 4,5,6,7,8
	Simulations	3	15% (15)	4, 6, 9	LO #1, 2, 3 and 4,8
	Class Project	1	5% (5)	13	LO # 1, 2,5,7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-5
	Final Exam	2 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Availability, integrity, confidentiality and control types, Security frameworks and cybercrimes, Intellectual property laws, Privacy
Week 2	Risk management and threat modeling, Risk assessment and analysis, Risk management frameworks, and personal security, Security governance.
Week 3	Information life cycle and classification, Layers of responsibilities.
Week 4	Retention policies, Protecting privacy.

Week 5	Architecture and operating systems, Security models, Certification vs. accreditation, Distributed system security.
Week 6	Cryptography and ciphering, Methods of encryption, Attacks on cryptography, Protecting assets.
Week 7	OSI model and TCP/IP model, Transmission and cabling.
Week 8	Networking devices and types of networks, Network encryption and attacks.
Week 9	Identification, authentication, authorization, Access control models and techniques.
Week 10	Access control admin and methods, Intrusion detection and prevention, Threats to access control.
Week 11	Vulnerability and penetration testing, Auditing admin control.
Week 12	Admin and configuration management, Physical security and provisioning.
Week 13	Network and resource availability, Preventative measures, Incident management process and disaster recovery.
Week 14	Building good code, Where does security place?, Secure software development.
Week 15	DevOps, Mobile code and web security, Malicious software (Malware).
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	CISSP: Study guide, 7th edition, Shon Harris and Fernando Maymi.	No
Recommended Texts		
Websites	websites. Libraries sites in international universities.	

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	Software Design			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CoE422				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	**Semester of Delivery**		2
Administering Department		Computer Engineering	**College**	Collage of Engineering	
Module Leader	Ali ALiedani		**e-mail**	Ali.nabeel@uobasrah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		11/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- To acquire skills to develop large programs - Handling exponential growth in complexity with size - Systematic techniques based on abstraction (modelling) and decomposition. 2- Learn systematic techniques of: - specification, design, user interface development, testing, project management, maintenance, etc. - appreciate issues that arise in team development 3- To acquire skills to be a better programmer - Higher productivity - Better quality programs
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. **Software requirements and specifications:** Requirements analysis modeling techniques, Prototyping, formal specification techniques, functional and non-functional requirements. 2. **Software design:** design concepts, architecture, structured design, Object-oriented analysis and design, Component-level design, Design for reuse, Quality in relation to specification (completeness, consistency, simplicity, verifiability). 3. **Software testing:** Testing fundamentals, tools, test plan creation, test case generation Validation planning, Black-box and white-box testing techniques, Unit integration, validation, system testing, Object-oriented testing, , Measures of Reliability and Availability, and inspections 4. **Software evolution:** Software maintenance, forms of maintenance, defect removal, upgrade, enhancement, Patterns of behavior, bottlenecks measurement, regression testing version control, Software re-use, and Reengineering. 5. **Project management:** Programming environments, Requirements analysis and design modeling tools, teams composition, project management difficulty, Resource allocation, Gantt charts, Project planning, costing, and timely compliance and delivery. 6. **Concurrent Design:** performance constraints, real-time features remands, Hardware and software co-design. 7. **Computer Interfaces**: define HCI, context, reasons, web interface, Human performance models, usability testing, graphical user interfaces GUI, web interfaces
Indicative Contents المحتويات الإرشادية	1- Introduction to Software Design: Importance of software design in the software development process. Basic principles and concepts of software design.

	Relationship between software design and other phases of software development. 2- Software Design Processes and Methodologies: Different software design processes and methodologies (e.g., waterfall, agile, iterative). Overview of popular design methodologies such as object-oriented design (OOD) and structured design. The role of requirements analysis and specification in software design. 3- Design Principles and Patterns: Fundamental design principles (e.g., SOLID principles) and their application. Design patterns (e.g., creational, structural, behavioral patterns) and their use in solving common design problems. Anti-patterns and common design mistakes to avoid. 4- Architectural Design: Introduction to software architecture and its importance. Different architectural styles (e.g., layered, client-server, microservices). Techniques for creating and documenting software architectures (e.g., UML diagrams, architectural patterns). 5- Component-Level Design: Modular design and component-based development. Designing software components and their interfaces. Techniques for managing dependencies and achieving loose coupling. User Interface Design: 6- Database design principles and normalization. Entity-Relationship (ER) modeling and relational database design. Data access and persistence strategies. System Design: 7- Testing and Design Validation: Designing for testability and maintainability. Unit testing, integration testing, and system testing. Verification and validation techniques for design correctness.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	1.5 hrs	10% (10)	8	LO # 1-7
	Final Exam	2 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – overview of software engineering approaches and terms.
Week 2	The tradition of Software Life Cycle Models
Week 3	The modern approach of Software Life Cycle Models
Week 4	SOFTWARE PROJECT MANAGEMENT
Week 5	Project Estimation Techniques
Week 6	REQUIREMENTS ANALYSIS AND SPECIFICATION
Week 7	Formal System Specification
Week 8	Overview of the Design Process
Week 9	FUNCTION-ORIENTED SOFTWARE DESIGN
Week 10	Object Modelling Using UML
Week 11	Object-Oriented Software Development
Week 12	Coding and Testing
Week 13	Software Reliability and Quality Management
Week 14	Software Maintenance
Week 15	**SOFTWARE REUSE**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: HTML part 1.
Week 2	Lab 2: HTML part 2.
Week 3	Lab 3: CSS
Week 4	Lab 4: PHP part 1
Week 5	Lab 5: PHP part 2
Week 6	Lab 6: MYSQL part 1
Week 7	Lab 7: MYSQL part 2
Week 8	Lab 8: implementation of web server
Week 9	Lab 9: Exploring the student project of Xampp
Week 10	Lab 10: preparing usecase of the project.

Week 11	Lab 11:ER-diagrams.
Week 12	Lab 12: UML part1.
Week 13	Lab 13: UML part 2.
Week 14	Lab 14: class diagrams.
Week 15	Lab 15: exploring the progress of asking project.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	SOFTWARE ENGINEERING & TESTING An Integrated Approach to Software Engineering	No
Recommended Texts	Fundamental of software engineering, RAJIB MALL	No
Websites	websites. Libraries sites in international universities.	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.