نموذج وصف البرنامج الأكاديمي





اسم الجامعة: جامعة كلكامش

الكلية/ المعهد: كلية الهندسة

القسم العلمي: هندسة الحاسوب

اسم البرنامج الأكاديمي او المهني: بكالوريوس

اسم الشهادة النهائية: بكالوريوس في هندسة الحاسوب

النظام الدراسي: بولونيا

تاريخ اعداد الوصف:

التوقيع :

اسم رئيس القسم:

التاريخ :

التوقيع :

اسم المعاون العلمي:

التاريخ :



دقق الملف من قبل

شعبة ضمان الجودة والأداء الجامعي

اسم مدير شعبة ضمان الجودة والأداء الجامعي:

التاريخ

التوقيع

مصادقة السيد العميد

1. Program Vision

Our vision is to create an environment where excellence thrives and minds are empowered to achieve their full potential. We strive to build a dynamic community of learners and innovators driven by curiosity and a genuine passion for learning. By combining strong academic foundations, hands-on practical experience, and collaborative research initiatives, we aim to prepare the next generation of engineers to lead technological advancements and make a meaningful impact on the world through their creativity.

2. Program Mission

Our mission is to educate and empower students in computer engineering, conduct pioneering research, and foster industry partnerships. We foster diversity, serve the community, and continually enhance our programs to meet

.evolving needs

3. Program Objectives

The strategic objectives of the Computer Engineering Department at the College of Engineering/University of Gilgamesh aim to prepare graduates who have successfully completed the four academic stages to become competent and qualified professionals. The department aims to:

- Provide effective and comprehensive education that prepares students for successful careers in engineering.

- Conduct high-impact research that advances knowledge and addresses critical societal needs.
- Promote diversity, equity, and inclusion within the engineering community.
- Collaborate with industry partners and stakeholders to create meaningful opportunities for students and faculty.
- Contribute to the development of sustainable technologies and practices that benefit society and the environment.

Educational Objectives of the Program

- Prepare graduates to become professional computer engineering practitioners and consultants working in reputable organizations.
- Encourage the pursuit of postgraduate studies and advanced scientific research at leading universities.
- Promote lifelong learning and continuous professional development among graduates.
- Encourage participation in professional associations and community service activities.

4. Program Accreditation

As part of its ongoing efforts to enhance academic quality, the Department of Computer Engineering at the College of Engineering, University of Gilgamesh, is currently working to fulfill the requirements necessary to obtain program accreditation.

5. Other external influences

The program maintains strong engagement with the labour market through practical training and field visits to government departments and relevant companies.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	**9**	**18**	**%15.5**	
College Requirements	**10**	**20**	**%17.2**	
Department Requirements	**39**	**78**	**%67.2**	
Summer Training				
Other				

* This can include notes whether the course is basic or optional.

7. Bologna Path : Program Description

Year/Level	Course Code	Course Name	Credit Hours		
First/First Semester	COE11301	**Mathematics I**	**theoretical**	**T**	**practical**
First/First Semester	COE11302	**Engineering drawing**	3	2	
First/First Semester	COE11303	**Computer Programming Methodology**	2		
First/First Semester	COE11304	**Fundamentals of digital System**	2	1	2
First/First Semester	ENG132	**English language**	2	1	2
First/First Semester	COE11305	**Fundamentals of electrical circuits I**	2	1	2

First/First Semester	ENG131	**Human Rights and Democracy**	2	1	2
First/Second Semester	COE12302	**Electronic Physics**	2		
First/Second Semester	COE12301	**Mathematics II**	2	2	2
First/Second Semester	COE12303	**Workshop**	3	2	
First/Second Semester	COE12304	**Fundamentals of computer organization**	2		2
First/Second Semester	COE12305	**Fundamentals of electrical circuits II**	2	1	2
First/Second Semester	ENG133	**Arabic language I**	2	1	2
Second / First Semester	ENG231	**Crimes of the Baath regime in Iraq**	2		
Second / First Semester	COE21301	**Object oriented programming**	2		
Second / First Semester	COE21302	**Engineering Mathematics**	2	1	2
Second / First Semester	COE21303	**Communication Fundamentals I**	2	**2**	**2**
Second / First Semester	COE21304	**Digital Systems Design I**	2	2	2
Second / First Semester	COE21306	**Electronics I**	2	1	2
Second/Second Term	COE22301	**Engineering Analysis**	2	1	2
Second/Second Term	COE22302	**Electronics II**	2	**2**	**2**
Second/Second Term	COE22303	**Communication Fundamentals II**	2	1	2
Second/Second Term	COE22304	**Digital Systems Design II**	2	1	2
Second/Second Term	COE22305	**Operating systems**	2	1	2
Second/Second Term	ENG232	**English language II**	4		
Second/Second Term	ENG233	**Arabic language II**	2		
Second/Second Term	COE22306	**Data structures and algorithms**	2		
Third/First semester	COE31301	**Probability**	2	1	2
Third/First semester	COE31301	**Software Engineering**	2		
Third/First semester	COE31302	**Web development**	2		
Third/First semester	COE31303	**Signals and Systems**	2	**1**	**2**

Third/First semester	COE31304	**Computer Architecture 1**	2		**2**
Third/First semester	COE31305	**Microprocessors 1**	2	**1**	
Third/First semester	COE31306	**Numerical Analysis**	2	**1**	**2**
Third/First semester	COE32301	**Database Systems**	2	**1**	
Third/Second semester	COE32302	**Digital Signal Processing**	2	**1**	**2**
Third/Second semester	COE32303	**Computer Architecture 2**	2	**1**	
Third/Second semester	COE32304	**Microprocessor Applications 2**	2	**1**	
Third/Second semester	COE32305	**Computer Networks**	2	**1**	**2**
	COE32306			**2**	

8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	Learning Outcomes Statement 1
• Understanding of fundamental computer engineering concepts and principles, including programming, data structures, algorithms, digital systems, computer networks, communication protocols, and network security. • Ability to analyze programming problems and develop effective and efficient solutions using acquired theoretical and practical knowledge. • Understanding of digital signal analysis and the mechanisms for converting signals between different representation systems. • Ability to design and implement digital algorithms for signal and data processing. • Understanding of computer network architecture and security principles, along with the ability to design, configure, manage, and troubleshoot networks. • Ability to use programming languages such as Python, C++, Java, and others to develop	A1 – Gaining Fundamental Knowledge: The program provides students with a deep and comprehensive understanding of core computer engineering concepts and principles, including fundamental topics in mathematics, programming, data structures, and algorithms. A2 – Understanding Digital Signals: The program includes the study and analysis of digital signals and their applications in various fields, such as signal processing and digital communications. A3 – Computer Networking Knowledge: The program covers the study of computer networks, beginning with fundamental networking concepts and extending to network design and management, including device connectivity, troubleshooting, and problem resolution. A4 – Programming Languages: The program offers students the opportunity to learn multiple programming languages and develop the ability to apply them effectively

software applications and solve engineering problems.	in software development and engineering problem-solving.
Skills	
• Students will acquire the ability to design and develop software applications independently, enabling them to produce innovative solutions to various technical challenges. They will also develop strong skills in writing and building software applications using a variety of programming languages. • Students will gain the ability to effectively analyze and solve technical problems related to computer hardware, contributing to improved efficiency and performance of technical systems. They will develop the necessary skills to diagnose, troubleshoot, and maintain computer hardware. • Students will acquire the knowledge and skills required to design and manage advanced computer networks, enabling them to build secure and efficient technical infrastructures. They will be capable of designing, configuring, maintaining computer networks and systems, and understanding the integration of related electrical circuits. • Students will be able to apply digital signal processing concepts and techniques to solve a wide range of technical problems, enhancing their ability to develop innovative and effective solutions. They will also develop and	– Develop the skills necessary to design and implement software applications using a variety of programming languages. – Gain the necessary skills to effectively diagnose, troubleshoot, and maintain computer hardware systems. – Design, configure, and maintain computer networks and systems, including the integration and connection of related electrical circuits. – Develop and implement advanced digital signal processing solutions using modern techniques and methods. –

implement advanced digital signal processing methods and applications.	
Learning Outcomes 3	Learning Outcomes Statement 3
values	
Instilling a spirit of creativity and innovation in students, and .developing their skills in finding innovative solutions	**Promoting creativity and innovation: The program aims to instill a spirit of creativity and encourage the development of innovative solutions to various challenges in the field of computer engineering**
Developing students' teamwork skills, leading to outstanding outcome	**Developing teamwork skills: The program seeks to enhance students' ability to work as effective teams, contributing to achieving distinctive and effective outcome .**
Promoting social responsibility and accountability in society and work	**Stimulating social responsibility: The program aims to develop a sense of responsibility among students and prepare them psychologically to assume responsibility in the workplace and society in general**
Promoting the values of diligence and perseverance, which .contributes to achieving academic and professional success	**Promoting the values of diligence and perseverance. The program focuses on developing the values of diligence and perseverance in students, which strengthens their will to achieve satisfactory results and success in their academic and professional paths**

9. Teaching and Learning Strategies

1. . Explanation and clarification through lectures, in person and electronically
2. .Display scientific materials using various display devices
3. .Self-learning through homework and small projects
4. .Use of laboratories in learning and practical application
5. .Completing graduation projects as part of the learning experience
6. .Benefit from scientific visits to sites of interest
7. .Attending scientific seminars held in the department
8. .Providing summer training opportunities to develop practical skills

10. Evaluation methods

1. Short comprehension tests
2. Homework
3. Final and semester exams for theoretical and practical subjects
4. Small projects integrated into lessons
5. Effective interaction during study sessions
6. Preparing scientific and exploration reports

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/ Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Lect.Dr.Dhamyaa Husam Moahmmed	**Electrical and Electronics Department**	Artificial Intelligence			√	

Assist.Lect.Jaafar Ali Jaafar	**Communication Engineering**	Optical communication system			√	
Assist.Lect.Haneen jamhour sabar					√	
Assist.Lect.Hawraa Ahmed Jasiem	**Information Engineering**	Information and Communication Engineering			√	
Assist.Lect.Aaid Mohammed Ameer	**Communications Engineering**	Wireless Communication Systems Engineering			√	
Assist.Lect.Ahmed Emad Saleem	**Electronic and communication Engineering**	Laser Application			√	
Assist.Lect.Lina Thamer Sultan	**Software Engineering**	Artificial Intelligence				√
Assist.Lect.Buraq karim shebli	**Computers and software engineering**	Programming-cyber security				√
Assist.Lect.Hikmat maad abdulmajeed	**Communication Engineering**	Optical Communication				√
Assist.Lect.Hasan Mohammed Khalil	**Electromechanical Engineering**	Navigation and Guidance Engineering				√

Professional Development

Mentoring new faculty members

1. Provide comprehensive guidance on the mission, objectives, and core values of the institution and department.

2. Provide customized training programs that incorporate innovative teaching methods and best academic practices.
3. Orient faculty members to institutional and departmental policies and procedures, including research ethics and quality assurance standards.
4. Provide opportunities for networking with colleagues and participation in research and professional development activities.

Professional development of faculty members

1. Providing specialized training courses in effective teaching strategies and modern educational technology.
2. Providing workshops to exchange experiences and best practices in teaching and applying them in the classroom.
3. Conducting periodic evaluations of faculty performance and learning outcomes to improve the educational process.
4. Encouraging participation in continuing professional development programs, such as seminars, workshops, and academic conferences.
5. Supporting scientific research and publication to enhance the academic competence of faculty members.
6. Providing opportunities for communication and collaboration among faculty in areas of common interest.
7. Providing qualification programs to develop academic management and leadership skills.

12. Acceptance Criterion

Admission to the college is through central admission for morning studies

.Average: not less than

62% Age: not more than

25 years

As for evening studies, admission is through direct application Average:

not less than 60%

Age: Unspecified

13.	**The most important sources of information about the program**
1.	.Local and international university websites
2.	.Workshops organized by the Ministry of Higher Education and their quality standards
3.	Guide of the Iraqi Council for Accreditation of Engineering Education
4.	.IEEE Computer Engineering Body of Knowledge .

14.	Program Development Plan

1- Needs Analysis: Conduct surveys and questionnaires to identify labor market demands and industry trends, as well as gather feedback from students and faculty regarding the strengths and weaknesses of the current program.

2- Curriculum Update: Develop modern curricula aligned with recent advancements, emerging technologies, and current industry requirements.

3- Projects and Workshops: Organize projects and workshops to enhance the learning experience and enable students to apply theoretical concepts to practical applications.

4- Focus on Practical Skills: Develop training programs that emphasize practical skills such as programming, systems design, and project management, while also strengthening communication and teamwork abilities.

5- Enhancing the Educational Environment: Improve the technical infrastructure, provide necessary learning resources, and promote interaction between students and faculty through virtual forums, seminars, and group lectures.

6- Monitoring and Evaluation: Establish effective mechanisms to monitor and evaluate the academic program's performance, analyze

student achievement data, and assess the extent to which learning objectives are met, enabling continuous improvement.

7- Collaboration with Industry: Build strong partnerships with companies and industrial institutions to guide curriculum development and provide students with training and employment opportunities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First	COE11301	Mathematics I	Basic	●				●				●			
	COE11302	Engineering drawing	Basic	●				●				●	●	●	●
	COE11303	Computer Programming Methodology	Basic	●			●	●				●	●		●
	COE11304	Fundamental s of digital System	Basic	●	●				●	●		●			
	ENG132	English language	Basic	●				●				●	●	●	●
	COE11305	Fundamental s of electrical circuits I	Basic	●	●				●	●	●	●	●	●	●
	ENG131	Human Rights and Democracy	Basic									●	●	●	●
	COE12302	Electronic Physics	Basic	●	●	●			●	●	●	●	●	●	●
	COE12301	Mathematics II	Basic	●		●		●				●			
	COE12303	Workshop	Basic	●	●	●		●	●	●	●	●	●	●	●
	COE12304	Fundamental s of computer organization	Basic	●	●	●		●	●	●	●	●	●	●	●
	ENG133	Arabic language I	Basic	●	●				●	●	●	●	●	●	●
	ENG231	Crimes of the Baath regime in Iraq	Basic	●	●	●		●				●	●		
	COE21301	Object oriented programming	Basic	●	●	●		●	●	●		●	●	●	
	COE21302	Engineering Mathematics	Basic	●			●	●	●	●		●	●		●

Second	COE21303	Communication Fundamentals I	Basic	●	●		●	●	●	●	●	●	●	●	●
	COE21304	Digital Systems Design I	Basic	●			●	●			●	●	●	●	●
	COE21306	Electronics I	Basic			●						●	●	●	●
	COE22301	Engineering Analysis	Basic	●		●						●	●	●	●
	COE22302	Electronics II	Basic	●	●	●	●	●	●	●	●	●	●		●
	COE22303	Communication Fundamentals II	Basic	●	●	●	●	●				●	●	●	
	COE22304	Digital Systems Design II	Basic	●	●	●	●	●	●	●		●	●		
	COE22305	Operating systems	Basic	●			●	●	●	●		●	●	●	●
	ENG232	English language II	Basic	●	●	●	●	●	●	●	●	●	●	●	●
	ENG233	Arabic language II	Basic	●			●	●	●			●	●		●
	COE22306	Data structures and algorithms	Basic		●				●	●	●	●	●		
Third	COE31304	Signals and Systems	Basic	●	●			●				●	●		
	COE31302	Software Engineering*	Basic	●			●	●	●	●	●	●	●	●	
	COE31303	Web development	Basic	●		●	●	●	●			●	●	●	●
	COE31305	Computer Architecture I	Basic	●		●	●	●	●		●	●	●		
	COE31306	Microprocessors 1	Basic	●		●		●	●	●		●	●		
	COE32301	Numerical Analysis	Basic	●	●				●	●		●	●	●	●
	COE32303	Digital Signal Processing	Basic	●	●			●				●	●		
	COE32302	Database Systems*	Basic	●			●	●	●	●	●	●	●	●	
	COE32306	Computer Networks*	Basic			●	●	●	●	●		●	●	●	●
	COE32304	Computer Architecture II	Basic	●		●	●		●	●	●	●	●	●	●

	COE32305	**Microprocessor Applications 2**	**Basic**	●		●		●	●	●		●	●		
	COE31305	**Computer Architecture I**	**Basic**	●	●				●	●		●	●	●	●

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

Course Descriptions for the Computer Engineering Department 2026-2025

Module Description Form

Module Information					
Module Title	***Computer programming methodology***			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE11303				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	computer engineering		**College**	College of engineering	
Module Leader	Asst.lect Haneen Gumhoor Sabbar		**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	haneen.g.sabbar@gu.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
	The main objectives of this course are to introduce the student the basic programming techniques by learning the C++ programming language. Then, start with the skills of writing the program and designing and implementing algorithms to solve the problem. The course gives an introduction to programming in C++ and includes topics such as:

Module Objectives أهداف المادة الدراسية	• Overview of Computers and Programming. • Introduction to Problems and Algorithms. • Problem-Solving Methodology. • Flowcharts, Decomposition outline, and Pseudo-code. • C++ Programming Basics (data types, operators and expressions, keywords and identifiers, variables and assignment, basic input/output routines). • Operators and Operations (Arithmetic Operators, Relational Operators, Logical Operators, Operators Precedence in C++, Bitwise Operators, Assignment Operators, and Casting Operators) • Math Operations in C++. • Input and Output statements. • Iteration (Loop) Statements. • Control Structures (sequence, selection [if, if\else, switch], iteration [for, while, do/while]), break and continue statements. • Arrays One dimension (1D), two dimensions (2D). • Learn how to create simple functions with different types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, the students will be able to do the following: 1. State the basic parts of any computer system and explain them. 2. Demonstrate the differences between various parts of the computer system (like RAMs and ROMs, Input / outputs, buses) and others. 3. Identify variables and constants and apply them in statements in the program. 4. Work with input output functions to inquire data from keyboard and display them on the monitor. 5. Deal with various mathematical and logical operations inside the program. 6. Construct flowcharts for solving different problems and presenting solutions. 7. Include many libraries in the programs that require extra functionalities. 8. be able to use conditional statements like (if, case,...) in the program and how to use them in various conditions. 9. Implement repetitive structures like (for) and how to utilize it inside the program. 10. Use the (while, do while) structures as an alternative for (for). 11. Write the syntax for identifying array and how to identify them in a program. 12. Understand the principle of indexing and how to manipulate indices throughout the program. 13. Write custom functions in the program and how to identify and use a new function by the user. 14. Provide learners with an understanding of how to read, write, and process array elements and functions in C++ and create new functions with return values and calls.

Indicative Contents المحتويات الإرشادية	1. Introduction to Programming: Basics of programming languages, program structure, variables, data types, operators, control structures (conditionals, loops), functions, and basic input/output. 2. Object-Oriented Programming (OOP): Concepts of objects, classes, inheritance, polymorphism, encapsulation, and abstraction. Implementation of OOP principles using a specific programming language. 3. Software Development Life Cycle (SDLC): Overview of the different phases of software development, including requirements gathering, analysis, design, implementation, testing, deployment, and maintenance. Introduction to methodologies such as waterfall, agile, and iterative development. 4. Algorithms and Data Structures: Introduction to fundamental algorithms and data structures, such as arrays, linked lists, stacks, queues, trees, graphs, sorting, searching, and complexity analysis. Design and implementation of algorithms and data structures. 5. Software Testing: Principles and techniques of software testing, including unit testing, integration testing, system testing, and acceptance testing. Test case design, test-driven development (TDD), and debugging strategies. 6. Version Control Systems: Introduction to version control concepts and tools such as Git. Working with repositories, branching, merging, and resolving conflicts. Collaborative development practices. 7. Software Design Principles: Principles and patterns for software design, including SOLID (Single Responsibility, Open-Closed, Liskov Substitution, Interface Segregation, Dependency Inversion), design patterns (e.g., Factory, Singleton, Observer), and architectural patterns (e.g., MVC, MVP, MVVM). 8. Software Documentation and Code Organization: Writing clear and effective code documentation. Best practices for code organization, naming conventions, and code modularity. 9. Debugging and Error Handling: Techniques for identifying and resolving software bugs. Strategies for error handling and exception management. 10. Software Development Tools: Introduction to integrated development environments (IDEs), code editors, and other tools used in the software development process.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	In this course, attendance is one of the mandatory tasks for students, since the key idea behind each topic the subject would be given during the lab. Also, assignments play an important role in keeping track of comprehending all the skills and problem-solving methods for topics. Exams are the true criterion for measuring the depth of students' understanding to the given material.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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 and 10	LO #3, #4,#6, #7, #9 and #14,
	Assignments	2	10% (10)	2 and 12	LO #7, #8, #9, #10, #12 and #14.
	Report	1	10% (10)	13	LO #6, #9, #11 and #13.
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1-#10
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Computers and their uses/ Hardware/Software, Programming languages/How to use/ run programs.
Week 2	Using computers in problem solving/ requirement specifications/ analysis.
Week 3	Design and representation of algorithms/ implementation / testing and verification/ program documentation.
Week 4	Input and output/ data types.
Week 5	Arithmetic and logical operators, precedence of operators.
Week 6	C++ program control and structured programming Selections, If statement, nested if statement, if-else if ladder else.
Week 7	Switch-case statements, nested switch-case statement.
Week 8	Mid-course Exam
Week 9	Counter controlled and sentinel-controlled repetition.
Week 10	The do-while and while loops.
Week 11	Skipping loop iterations break and continue and exit() function..
Week 12	Labels and goto statement, nested loops.
Week 13	Using the array data structure to represent lists and tables of values, One-dimensional array creation, initialization and processing.
Week 14	Two-dimensional array creation, initialization and processing.
Week 15	Functions in C++, New Function Creation, Return Values, and Call.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Create a C++ project
Week 2	Lab 2: Variables and Data Types
Week 3	Lab 3: Operators and Operations
Week 4	Lab 4: Input and Output statements
Week 5	Lab 5: Iteration (Loop) Statements
Week 6	Lab 6: Loop Control Statements and Decision-Making statements

Week 7	Lab 7: Create simple functions with different types

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Deitel, P and Deitel H, C++ How to Program, 8th Edition, Prentice Hall 2012.	No
Recommended Texts	1. Bradley, A, Programming for Engineers, Springer, 2011. 2. Bronson, G, C for Engineers and Scientists, West Publishing Company, 1993.	No
Website	https://www.w3schools.com/cpp/default.asp	

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

Module Information

Module Title	**Fundamentals of Electrical Circuits I**			**Module Delivery**
Module Type	**C**			☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**
Module Code	COE11305			
ECTS Credits	**7**			
SWL (hr/sem)	**175**			
Module Level	UGI	**Semester of Delivery**	1	
Administering Department	Computer Engineering	**College**	College of Engineering	
Module Leader	Asst.lect Hikmat Maad Abdulmajeed	**e-mail**		
Module Leader's Acad. Title		**Module Leader's Qualification**		
Module Tutor	-	**e-mail**	hikmat.maad@gu.edu.iq	
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date	01/10/2025	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. Understand the fundamental concepts of electric circuits, including voltage, current, resistance, and power, and their relationships as defined by Ohm's law. 2. Analyze and solve basic DC circuits using techniques such as series and parallel circuit analysis, voltage division, and current division. 3. Apply Kirchhoff's laws (Kirchhoff's current law and Kirchhoff's voltage law) to analyze and solve complex DC circuits. 4. Calculate the equivalent resistance of resistors in series and parallel configurations and apply this knowledge to simplify complex resistor networks. 5. Analyze circuits using various circuit analysis techniques, such as nodal analysis and mesh analysis, to determine voltage, current, and power relationships. 6. Apply important circuit theorems, such as the superposition theorem, Thevenin's theorem, and Norton's theorem, to simplify complex DC circuits and calculate unknown quantities.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of basic electrical concepts: Students should gain a solid understanding of fundamental electrical concepts such as voltage, current, resistance, and power. They should be able to apply Ohm's law and solve basic electrical circuit problems using these concepts. 2. Analysis of DC circuits: Students should be able to analyze and solve DC circuits using techniques such as Kirchhoff's laws, nodal analysis, and mesh analysis. They should be able to calculate voltage drops, current flows, and power dissipation in different parts of a circuit. 3. Circuit components and their behavior: Students should learn about various circuit components such as resistors, and understand their behavior in DC circuits. They should be able to calculate the equivalent resistance of resistors in series and parallel. 4. Circuit theorems: Students should be familiar with important circuit theorems such as the superposition theorem, Thevenin's theorem, and Norton's theorem. They should be able to apply these theorems to simplify complex DC circuits and calculate unknown quantities. 5. Circuit analysis techniques: Students should develop skills in circuit analysis techniques, including using circuit diagrams, identifying circuit elements, and applying systematic problem-solving approaches. They should be able to analyze simple and complex DC circuits to determine voltage, current, and power relationships. 6. Laboratory skills: Depending on the course, students may have the opportunity to apply their theoretical knowledge through hands-on laboratory experiments. They should develop skills in using measurement instruments, constructing circuits, and verifying theoretical concepts through practical experiments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Electric Circuits: [15Hours] - Basic concepts of voltage, current, resistance, and power - Circuit elements: resistors, capacitors, and inductors - Circuit diagrams and symbols 2. Ohm's Law and DC Circuit Analysis: [15Hours] - Ohm's law and its applications

	- Series and parallel circuits - Voltage and current division - Power calculations in DC circuits 3. Equivalent Resistance and Circuit Simplification: [15Hours] - Equivalent resistance in series and parallel circuits - Voltage and current division using equivalent resistances - Circuit simplification techniques 4. Kirchhoff's Laws and Circuit Analysis Techniques: [15Hours] - Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL) - Nodal analysis and mesh analysis 5. Circuit Analysis using Circuit Theorems: [15Hours] - Application of superposition theorem - Thevenin's theorem and Norton's theorem - Maximum power transfer theorem 6. Review and Assessment: [5Hours] - Review of key concepts and techniques - Practice problems and exercises - Summative assessments (quizzes, tests, or exams)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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 and 12	
	Assignments	2	10% (10)	7 and 13	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Electrical circuit, electrical current, voltage difference, notations
Week 2	Basics of Network Elements- Types of voltages, types of currents, power and energy
Week 3	Resistors and resistivity, Conductance, and Conductivity

Week 4	Ohm's law, and Temperature effect
Week 5	Series and parallel circuits,
Week 6	Delta -star , and star - delta transformation, Kirchhoff's laws.
Week 7	Mesh current analysis
Week 8	Mid-course Exam
Week 9	Branch current method
Week 10	Sources transformation
Week 11	Node voltage analysis
Week 12	Super-position circuit analysis theorem
Week 13	Thevinon's theorem
Week 14	Norton theorem
Week 15	Maximum power transfer
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Basic information and ohm's law
Week 2	Lab 2: Series and parallel circuits
Week 3	Lab 3: Voltage and Current divider
Week 4	Lab 4: Delta-Star connection
Week 5	Lab 5: Mesh and Nodal
Week 6	Lab 6: Superposition, Thevinen, and Norton theorems
Week 7	Lab 7: Maximum Power Transfer

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introductory circuit Analysis; by Robert L. Boylestad	Yes
Recommended Texts	Sadiku, Matthew NO, and Charles K. Alexander. Fundamentals of electric circuits. New York: McGraw-Hill, 2009.	No
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	**Engineering drawing**			**Module Delivery**	
Module Type	**B**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE11302				
ECTS Credits	2				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		computer engineering	**College**	College of engineering	
Module Leader	Asst. lect Hikmat Maad		**e-mail**	hikmat.maad@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The aim of this module is to provide students with a comprehensive understanding of engineering drawing principles and techniques. It aims to develop their skills in creating and interpreting technical drawings, which are essential in the field of engineering. The module also aims to enhance students' spatial visualization abilities and their understanding of the relationship between 2D representations and 3D objects. 2. Describing the AutoCAD program and Its icons, knowing what's new in AutoCAD version. 3. The students will have skills to use that's program and drawing any things (2D). 4. Reading plans of projects . 5. How to make show for them projects . 6. Auto desk AutoCAD software provide powerful ,integrated 2D modeling, drawing ,and layers tools that enable designers to focus more energy on creative ,rather than technical challenges
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate an understanding of the principles and conventions of engineering drawing. 2. Apply appropriate techniques to create accurate and precise engineering drawings. 3. Interpret and analyze technical drawings, including dimensions and annotations. 4. Learn drawing skills by AutoCAD . 5. Learn to read construction plans by AutoCAD . 6. Increase the student's imagination by AutoCAD .

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. <u>Introduction to Engineering Drawing</u> Importance of engineering drawing in the design and manufacturing process. Standards and conventions in engineering drawing. Types of technical drawings: orthographic projections, isometric projections, etc. 2. <u>Drawing Instruments and Techniques</u> Overview of drawing instruments and their uses Sketching techniques and line types Scaling, dimensioning, and labeling 3. <u>Orthographic Projections</u> Principles of orthographic projection Multi view drawings Sectional views and conventions 4. <u>Isometric Projections</u> Introduction to isometric projections Isometric drawing techniques and isometric scales Isometric views of objects and assemblies Extracting 2D Drawings form Isometric drawing. 5. Creating and Modifying Components by AutoCAD. 6. Modeling and Modifying Elements by AutoCAD.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	In this module, a combination of project-based learning, lectures, and group discussions will be utilized to create an engaging learning environment. Students will apply engineering drawing principles and techniques to real-world scenarios, participate in interactive lectures using visual aids and examples, collaborate in group discussions to analyze and problem-solve, engage in practical exercises and workshops to develop technical drawing skills with traditional tools and CAD software, and conduct independent study.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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**	12	15% (15)	Continuous	
	Assignments	12	20% (20)	Continuous	
	Projects / Lab.	3	5% (5)	12,13,14 and 15	
	Report				
Summative	**Midterm Exam**	2hr	10% (10)	7	

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Principle of engineering drawing
Week 2	Sketching techniques and line types & Scaling, dimensioning, and labeling
Week 3	Principles of orthographic projection
Week 4	Multiview drawings in orthographic projection
Week 5	Sectional views and conventions
Week 6	Introduction to isometric projections
Week 7	Isometric drawing techniques and isometric scales
Week 8	Isometric views of objects and assemblies Extracting 2D Drawings form Isometric drawing
Week 9	Mid exam
Week 10	1- Introduction - Theory lectures on history of AutoCAD program, what's new versions, how to install program. 2- Explanation the main window for program, how to arrange it before start work.
Week 11	how to use file icon from the window(open,new,save ,save as,export,merge ,drawing properties .draw orders(line and construction line with types of lines (hidden and center lines)) and modify (erase,move,copy) Orthogonally ,snaps, grid, scale and explode .
Week 12	Draw Arcs,polyline,circles and rectangle Draw Ellipses ,trim and extend orders , rotate and mirror.

Week 13	term Exam + tutorial. And Application of previous orders. Layer order (how to change color,name,type and thickness of line by layer)
Week 14	Explanation of construction and architectural plans and types of lines(showing examples) and Application of previous orders.
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 10	Introduction - Theory lectures on history of AutoCAD program
Week 11	draw orders(line and construction line with types of lines (hidden and center lines)
Week 12	Layer order (how to change color,name,type and thickness of line by layer)
Week 13	Explanation of construction and architectural plans and types of lines

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1-Manual of engineering drawing - Simmons C.H., Maguire D. E. 2-Autodesk AutoCAD 2021: Learn CAD With Ease (For Beginners) Hardcover – February 20, 2021 by Madhumita Kshirsagar.	no

Recommended Texts	1- Giesecke, Frederick Ernest, et al. Technical drawing with engineering graphics. Vol. 15. Prentice Hall, 2016. 2- French, Thomas Ewing, and Charles J. Vierck. The fundamentals of engineering drawing and graphic technology. McGraw-Hill Companies, 1978.	yes
Websites	https://www.autodesk.com/	

Grading Scheme

مخطط الدرجات

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

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

Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Digital Systems**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE11304				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	Asst.lect Aaid Mohammed		**e-mail**	aaid.m.ameer@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	-		**e-mail**		
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understanding of basic Number Systems: Students should gain a solid understanding of various number systems and Codes such as decimal, binary, octal, hexadecimal, Binary Coded Decimal (BCD).and Gray system. 2. Analysis of LOGIC Gates: Students should be able to analyze and solve LOGIC Gates using tables for each circuit such as and, or, and other gates. 3. Boolean algebra and Logic Simplification: Students should learn about various rules and theorem of Boolean algebra and DeMorgan's Theorems. They should be able to calculate the equivalent expression of logic circuits by using Karnaugh map and SOP. 4. Combinational Logic Analysis: Students should be familiar with basic combinational circuit, they should be able to apply the pulse waveform inputs to the Combinational Logic gates and calculate the observed outputs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize various number system and codes. 2. Use the various way to convert from system to another ones and vice versa. 3. Understand and apply the arithmetic operation for some of the system like sum, subtract, division and multiplication. 4. Apply some of arithmetic operation in logical circuit. 5. Describe logical gates like (and, or, not, nor, nand and ex-or). 6. Define the operation of each gate. 7. Identify the Boolean algebra and DeMorgan's theorems. 8. Apply Boolean algebra and DeMorgan's theorems to simplify the expressions. 9. Apply Karnaugh map and SOP to simplify the expression. 10. Explain the basic combinational logic circuit. 11. Apply the rules and use only (nand and nor gates) in connected circuit. 12. Identify the pulse waveform and applying it in the combinational logic circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Digital Systems and Binary Numbers • 1.1 Digital Systems 1 • 1.2 Binary Numbers • 1.3 Number-Base Conversions • 1.4 Octal and Hexadecimal Numbers • 1.5 Complements of Numbers • 1.6 Signed Binary Numbers • 1.7 Binary Codes • 1.8 Binary Storage and Registers • 1.9 Binary Logic. 2. Boolean Algebra and Logic Gates • 2.2 Basic Definitions • 2.3 Axiomatic Definition of Boolean Algebra • 2.4 Basic Theorems and Properties of Boolean Algebra

	• 2.6 Canonical and Standard Forms • 2.7 Other Logic Operations
	• 2.8 Digital Logic Gates • 2.9 Integrated Circuits 3. Gate-Level Minimization • 3.1 Introduction • 3.2 The Map Method • 3.3 Four-Variable K-Map • 3.4 Product-of-Sums Simplification • 3.5 Don't-Care Conditions • 3.6 NAND and NOR Implementation • 3.7 Other Two-Level Implementations • 3.8 Exclusive-OR Function • 3.9 Hardware Description Language 4. Combinational Logic • 4.1 Combinational Circuits • 4.2 Analysis Procedure • 4.3 Design Procedure • 4.4 Binary Adder–Subtractor2.6 Decimal Adder • 4.5 Binary Multiplier • 4.6 Magnitude Comparator • 4.8 Decoders • 4.9 Encoders • 4.10 Multiplexers • 4.11 HDL Models of Combinational Circuits
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا	

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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 and 12	
	Assignments	2	10% (10)	7 and 13	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	1 Digital Systems and Binary Numbers 1.1 Digital Systems 1 1.2 Binary Numbers 1.3 Number-Base Conversions 1.4 Octal and Hexadecimal Numbers

Week 2	1.5 Complements of Numbers 1.6 Signed Binary Numbers 1.7 Binary Codes
Week 3	1.8 Binary Storage and Registers 1.9 Binary Logic.
Week 4	2 Boolean Algebra and Logic Gates 2.2 Basic Definitions 2.3 Axiomatic Definition of Boolean Algebra
Week 5	2.4 Basic Theorems and Properties of Boolean Algebra 2.6 Canonical and Standard Forms
Week 6	2.7 Other Logic Operations 2.8 Digital Logic Gates 2.9 Integrated Circuits
Week 7	Mid Exam
Week 8	3 Gate-Level Minimization 3.1 Introduction 3.2 The Map Method 3.3 Four-Variable K-Map
Week 9	3.4 Product-of-Sums Simplification 3.5 Don't-Care Conditions
Week 10	3.6 NAND and NOR Implementation 3.7 Other Two-Level Implementations
Week 11	3.8 Exclusive-OR Function 3.9 Hardware Description Language
Week 12	4 Combinational Logic 4.1 Combinational Circuits 4.2 Analysis Procedure

Week 13	4.3 Design Procedure 4.4 Binary Adder–Subtractor2.6 Decimal Adder 4.5 Binary Multiplier 4.6 Magnitude Comparator
Week 14	4.8 Decoders 4.9 Encoders 4.10 Multiplexers 4.11 HDL Models of Combinational Circuits
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: logic gates
Week 2	Lab 2: logic gates
Week 3	Lab 3: Basic Combinational Logic Circuits
Week 4	Lab 4: Implementing Combinational Logic.
Week 5	Lab 5: Combinational Logic NOR Gates
Week 6	Lab 6: Combinational Logic Using NAND gates
Week 7	Exam
Week 8	Lab 7: adders
Week 9	Lab 8: Comparator
Week 10	Lab 9: Decoders
Week 11	Lab 10: Encoders
Week 12	Lab 11: Multiplexers
Week 13	Lab 12: Demultiplexers
Week 14	Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	M. Morris Mano, Michael D., Digital Design, 4th edition, Ciletti Prentice Hall	Yes
Recommended Texts	Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Prentice Hall	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	**Mathematics I**			**Module Delivery**	
Module Type	**B**			☒**Theory** ☒**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE11301				
ECTS Credits	4				
SWL (hr/sem)	**100**				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	computer engineering		**College**	College of engineering	
Module Leader	Asst.Lect Ahmed Emad		**e-mail**	ahmed.e.saleem@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Make students able to analyze engineering problems and formulate mathematical models to solve them. 2. Understand mathematical concepts in engineering as apply matrix techniques to problems in engineering 3. Expressing linear transforms in other forms, such as matrix equations and vector equations. 4. Distinguishing between homogeneous and nonhomogeneous systems. 5. Apply systems of linear equations to problems in networking 6. Use the characteristic polynomial to find all eigenvalues and eigenvectors 7. In engineering, by domain and range one can used to design and optimize systems. 8. Build a mathematical toolkit: The course introduces various mathematical tools and techniques necessary for engineering analysis. This includes algebraic manipulation, trigonometric functions, calculus operations (such as differentiation and integration)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and perform operations on matrices, including addition, subtraction, multiplication, and determination. 2. Apply Cramer's rule to solve systems of linear equations. 3. Calculate determinants and use them to determine properties of matrices. 4. Determine eigenvalues and eigenvectors of matrices. 5. Analyze and graph functions, including determining their domain and range. 6. Evaluate limits and determine continuity of functions. 7. Apply differentiation rules, including the chain rule and implicit differentiation, to find derivatives. 8. Apply integration rules and techniques, including integration by parts and partial fractions, to find

	antiderivatives. 9. Solve problems involving definite and indefinite integrals. 10. Understand and graph trigonometric functions, and apply their properties to solve problems. 11. Perform derivations and integrations involving trigonometric functions 12. Apply logarithmic and exponential functions in solving problems, and perform derivations and integrations involving these functions.
Indicative Contents المحتويات الإرشادية	• Matrices: Introduction to matrices and their operations. Determinants of matrices. Cramer's rule for solving systems of linear equations. Inverse matrices. • Systems of Linear Equations: • Eigenvalues and Eigenvectors: Understanding eigenvalues and eigenvectors of matrices. • Real Numbers and Functions: Understanding real numbers and intervals. Graphing functions and determining their domain and range. • limit and continuity Introducing the concept of limit and continuity. • Differentiation: Differentiation rules and examples. Chain rule and implicit differentiation. • Integration: Integration rules and techniques. Definite and indefinite integrals. • Trigonometric functions properties , Derivatives and integrals of Trigonometric functions • Logarithmic and Exponential Functions: Derivatives and integrals of logarithmic and exponential functions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Giving theoretical lectures 2- Solve many problems 3- Using illustration methods such as drawing 4- Direct discussion by asking questions and opening dialogue and interaction with students. 5- Giving video lecture if need

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) 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	20% (20)	Continuous	
	Assignments	2	10% (10)	Continuous	

	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Matrices: introduction, operation
Week 2	Matrix determination
Week 3	Inverse Matrices
Week 4	Solving a system of linear equations by Cramer's rule
Week 5	Solving a system of linear equations by inverse method
Week 6	Eigen value and Eigen vector
Week 7	(Mid-term Exam)
Week 8	Real Numbers, Intervals, Functions:graphs , domain and range
Week 9	Limit and continuity
Week 10	Differentiation
Week 11	Chain rule, implicit Differentiation
Week 12	Rules of integration, Definite and indefinite integrals
Week 13	trigonometric functions: derivations, integrations
Week 14	natural logarithm , exponential e^x: properties, derivations, integrations
Week 15	a^x, log_a^u : properties, derivations, integrations
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus By Thomas	Yes
Recommended Texts	CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS ,STEPHEN DAVIS	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	**Democracy and human rights**			**Module Delivery**	
Module Type	**B**			☒**Theory** ☒**Lecture** ☐ **Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	ENG131				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	Computer engineering		**College**	Collage of engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	5. Familiarize students with human rights and duties towards the individual and society 6. Highlighting the importance of the individual knowing his rights to carry out his duties to the fullest 7. Encouraging the student to study human rights, which contributes to the development of his thinking skills about human rights and freedom, and informs him of its bright side. 8. Introducing the student to how to deal with international and regional treaties and their internal legislation and to derive knowledge related to those rights and how to reflect them and their real and civilized role in the lives of peoples
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 7. Study theories of human rights and democracy 8. Clarification of the historical stages of human rights and their development 9. Clarification of the most important rights and duties granted to the individual and guaranteed constitutionally, which contribute to changing his life for the better 10. Promoting the idea of social justice for all individuals without discrimination on the basis of religion, race or color 11. Emphasizing and raising the spirit of citizenship, promoting the idea of belonging to the land and the homeland, and adhering to laws and regulations 12. Enhancing the student's thinking skill and creating his confidence during the dialogue on human rights 13. Introducing him to the method and mechanism of real dealing between the international and domestic community with human rights 14. Developing knowledge related to human rights and how they are reflected and their true civilized role in the lives of peoples

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Linguistic definition of the term human rights, its concept and origin Examples of the views of Arab and foreign scholars on the term human rights Definition of the French Declaration of the Rights of Man and of the Citizen The historical development of the idea of human rights, which we start with human rights in the civilization of Mesopotamian and Clarifying the structure of the social system in the Mesopotamian civilization The Universal Declaration of Human Rights, its history and provisions The phenomenon of administrative corruption and its repercussions on the human rights of the individual and society and ways to combat it and protect the individual and society from it Types of public rights and freedoms, which are divided into basic, intellectual and political rights Statement of basic rights, which include the right to life, dignity, liberty and personal safety, as well as the right to privacy, residence, movement and nationality A statement of intellectual rights and freedoms, which include freedom of belief and religion, freedom of expression, freedom of assembly and assembly, the right not to assemble, freedom of the press, as well as freedom of radio, television, cinema, theater, freedom of education, and the right to form associations and political parties A statement of political rights, which includes the right to equality and election The concept of democracy, its definition, and its types

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Giving theoretical lectures in an interactive way between the professor and the student in a direct way Using the method of direct discussion, asking questions, opening dialogue, setting examples, and interacting with students Giving students space to manage part of the lecture time to improve and expand critical thinking skills at the same time as applying a human right to presenting and defending his opinion without exposure to the opinion of others Assign students to prepare reports and billboards on the subject of human rights

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5 and 10	
	Assignments	2	10% (10)	2 and 12	
	Projects / Lab.				

	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Meaning of right in the Arabic language and The concept of human rights**
Week 2	**Definition of human rights and the Universal Declaration of Human Rights**
Week 3	**The wisdom of God Almighty granting human rights and the French Declaration of Human and Citizen Rights**
Week 4	**Human rights in the Mesopotamian civilization**
Week 5	**The Social System in Mesopotamia Civilization**
Week 6	**the Universal Declaration of Human Rights**
Week 7	**The phenomenon of administrative corruption and its repercussions and successful solutions to combat administrative corruption and protect society from it**
Week 8	**semester exam**
Week 9	**Fundamental rights and freedoms: the right to life and the right to dignity, liberty and personal safety**
Week 10	**The right to privacy, freedom of residence and movement, and the right to nationality**
Week 11	**Intellectual rights and freedoms: freedom of belief and religion, freedom of opinion and expression, the right to assembly and assembly, and the right not to assemble**
Week 12	**Freedom of the press, freedom of radio, television, cinema and theatre, freedom of education and the right to form associations and political parties**
Week 13	**Political rights: the right to equality and election**
Week 14	**Democracy concept and definition**

Week 15	**Types of democracy**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Human rights between text and application , Dr. Ali Shukri	Yes
Recommended Texts	Human rights , Dr. Maher Allawi	No
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

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Fundamentals of Electrical Circuits I	**Module D**	**Semester**	1
Co-requisites module	None		**Semester**	
Module Code	COE12305	☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
ECTS Credits	7			
SWL (hr/sem)	175			

Module Level	UGI	**Semester of Delivery**	2
Administering Department	Computer Engineering	**College**	College of Engineering
Module Leader	Asst. lect Hikmat Maad	**e-mail**	hikmat.maad@gu.edu.iq
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	-	**e-mail**	-
Peer Reviewer Name		**e-mail**	E-mail
Scientific Committee Approval Date	01/2/2026	**Version Number**	1.0

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1- Understand the concept of impedance and apply it to analyze AC circuits, including calculating voltage and current phasors, and determining impedance values for capacitors and inductors. 2- Apply network theorems such as Thevenin's theorem, Norton's theorem, and superposition theorem to simplify complex AC circuits and calculate unknown quantities. 3- Calculate and analyze power in AC circuits, including real power, reactive power, apparent power, and power factor. Apply power factor correction techniques and calculate power losses and efficiency. 4- Analyze and solve series and parallel resonance circuits, including determining resonant frequency, bandwidth, quality factor, and understanding the frequency response characteristics.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- AC Circuit Components: Students should learn about AC Generation and circuit components such as capacitors, inductors. They should understand their behavior in AC circuits, including the calculation of reactance, impedance, and power dissipation 2- AC Circuit Analysis: Students should develop a thorough understanding of alternating current (AC) circuits and their analysis. They should be able to apply concepts such as impedance, phasors, and complex numbers to analyze AC circuits, including calculating voltage and current phasors, power factor, and reactive power. 3- Circuit Analysis Techniques: Building upon the skills learned in Electric Circuit I, students should further develop their circuit analysis techniques. They should be able to analyze complex AC circuits using nodal analysis, mesh analysis, and various network theorems such as superposition, Thevenin, and Norton. 4- Power Analysis: Students should learn about power calculations in AC circuits, including real power, reactive power, and apparent power. They should understand power factor correction techniques and be able to calculate power losses and efficiency in AC circuits. 5- Resonance and Frequency Response: Students should understand the concept of resonance in AC circuits and be able to analyze series and parallel resonance circuits. They should be able to calculate resonant frequency, bandwidth, and quality factor, and understand the frequency response of different circuits. 6- Laboratory Skills: Depending on the course, students may have the opportunity to apply their theoretical knowledge through hands-on laboratory experiments. They should further develop skills in using measurement instruments, constructing and analyzing AC circuits, and verifying theoretical concepts through practical experiments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to AC Circuits: - Review of basic concepts: voltage, current, and resistance - Characteristics of AC voltage and current waveforms - RMS, peak, and average values of AC quantities - Phase relationship between voltage and current in AC circuits 2. Impedance and Phasor Analysis: - Definition and calculation of impedance - Representation of AC quantities using phasor diagrams

	- Complex numbers and their application in AC circuit analysis - Series and parallel impedance combinations in AC circuits 3. AC Circuit Analysis Techniques: - Application of Kirchhoff's laws (KCL and KVL) in AC circuits - Nodal analysis and mesh analysis in AC circuits 4. Power Analysis in AC Circuits: - Real power, reactive power, and apparent power in AC circuits - Power factor and power factor correction techniques - Calculation of power losses and efficiency in AC circuits 5. Resonance and Frequency Response: - Series and parallel resonance in AC circuits - Calculation of resonant frequency, bandwidth, and quality factor - Frequency response of AC circuits and its analysis 6. Review and Assessment: - Review of key concepts and techniques - Practice problems and exercises - Summative assessments (quizzes, tests, or exams)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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 and 10	LO #1 and #4
	Assignments	2	10% (10)	8 and 11	LO #3 and #4
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #4,and #5
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Sinusoidal Alternating Current, AC Generation, Average Value
Week 2	RMS value, Response of Basic R, L, and C Elements to a Sinusoidal Voltage or Current
Week 3	Frequency response of the basic elements, Complex Number, Phasors
Week 4	Series Configurations in AC Circuits
Week 5	Parallel Configuration in AC Circuits
Week 6	Mesh & Nodal in AC
Week 7	Mid-course Exam
Week 8	Network Theorems in AC circuits: Superposition ,
Week 9	Thevenin's and Norton's theorems
Week 10	Power in AC circuits: Average power and power factor
Week 11	Reactive power , apparent power, and power triangle

Week 12	Power factor correction
Week 13	Resonance: series resonance, The Quality Factor (Q), resonance bandwidth
Week 14	Parallel resonance, parallel resonance Frequency
Week 15	Parallel resonant bandwidth, examples
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Capacitive and Inductive Reactance
Week 2	Lab 2: Resistor & Inductor in Series
Week 3	Lab 3: Resistor & Capacitor in Series
Week 4	Lab 4: Resistor, Inductor & Capacitor in parallel
Week 5	Lab 5: Series-parallel Resistor, Inductor & Capacitor circuits
Week 6	Lab 6: AC superposition
Week 7	Lab 7: Series Resonance circuits

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introductory circuit Analysis; by Robert L. Boylestad	Yes
Recommended Texts	Sadiku, Matthew NO, and Charles K. Alexander. Fundamentals of electric circuits. New York: McGraw-Hill, 2009.	No
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	**Electronic Physics**			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE12302				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/2/2026		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	none	**Semester**	
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: 1- enable the student to have a solid background in electronic physics 2- enable the student to have a solid background in the analysis of the characteristics and circuits of diode and zener diode. 3- the student will learn the specifications and applications of the diode and zener diode.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Will be able to tell theory of semiconductors: Explains an atom and basic terms related with an atom. 2- Recognizes conductor, semiconductor, and insulator and explains characteristics of these materials. 3- Recognizes p and n type materials and explains characteristics of these materials. 4- Will be able to recognize types of diode, explain basic terms related with diodes and tell the operating principle of diodes 5- Will be able to analyze different diode circuits. 6- Recognizes half-wave, full-wave and bridge rectifier circuits and explains the operation of these circuits. 7- Recognizes clipping and clamping circuits, explains the operation of these circuits and analyses these circuits. 8- Analyzes and measures parameters in basic diode circuits.
Indicative Contents المحتويات الإرشادية	1- Will be able to tell theory of semiconductors. - Explains an atom and basic terms related with an atom. - Recognizes conductor, semiconductor, and insulator and explains characteristics of these materials. - Recognizes p and n type materials and explains characteristics of these materials. 2- Will be able to recognize types of diode, explain basic terms related with diodes and tell the operating principle of diodes. - Recognizes types and the construction of diodes. - Explains ideal diode, equivalent circuit and dc characteristic of a diode. - Tells the operating principles of diodes and zener diodes.

	3- Will be able to analyze different diode circuits. - Recognizes half-wave, full-wave and bridge rectifier circuits and explains the operation of these circuits. - Recognizes clipping and clamping circuits, explains the operation of these circuits and analyses these circuits. - Analyzes and measures parameters in basic diode circuits.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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**	3	30% (30)	4,9,10	LO #1, 2,3, 4 and 5
	Assignments	2	10% (10)	10,14	LO # 7 and 8
Summative assessment	**Midterm Exam**	2 hr	10% (10)	6	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction:** Atomic structure & electronic state (orbit, energy and valence) of electron.
Week 2	semiconductors, conductors and isolators, effects of temperature on depletion layer and P-N junction.
Week 3	**Characteristics of Diode:** forward and reverse bias and its relations.
Week 4	the diode operation and its conditions.
Week 5	zener region in terms of voltage and power dissipations, DC & AC resistance.
Week 6	Mid-Term Exam
Week 7	**Specifications of diode:** diode capacitance, reverse recovery time
Week 8	diode measuring and testing
Week 9	**Diode applications:** load line analysis,
Week 10	series diode configuration
Week 11	parallel & series configurations
Week 12	half – wave rectifier and peak reverse voltage
Week 13	full wave rectifier and related circuits (biased, diode clippers and clampers)
Week 14	zener diode and its applications
Week 15	**Review**
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:

Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.	yes
Recommended Texts	" Electronic Devices", By Floyd. 9th ed.	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	**Mathematics II**	**Module Delivery**	
Module Type	**B**		☒**Theory**
Module Code	COE12301		☐**Lecture**
ECTS Credits	**4**		☐**Lab**
SWL (hr/sem)	**100**		☒**Tutorial**
			☐**Practical**
			☐**Seminar**

Module Level	UGI	**Semester of Delivery**	2
Administering Department	Computer engineering	**College**	College of engineering
Module Leader	Asst.Lect Ahmed Emad	**e-mail**	ahmed.e.saleem@gu.edu.iq
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/2/2026	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module		**Semester**	1
Co-requisites module		**Semester**	

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

Module Objectives أهداف المادة الدراسية	The objective of this course is to develop an understanding of the basic ideas of mathematics encountered in engineering. Focus will be on the methods for understanding complex numbers and fundamentals of the derivative and integration of inverse trigonometric functions. Students will learn some special integration techniques (Integration by part, partial fraction, and substitution) that are useful for the understanding of different engineering subjects. Another objective is to teach the Engineering student about integration applications such as Area under curve and volume. Finally, the student will learn the concept of polar coordinates and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- On completion of the course, student will be able to: 2- Understand the fundamentals of complex numbers and their properties. 3- Understand the differentiation and integration of inverse trigonometric functions. 4- Understand the differentiation and integration of hyperbolic trigonometric functions. 5- Express the concepts of methods of integration and their different types which can be used in a wide variety of disciplines in engineering. 6- Identify integration applications such as Area under curve and area between two curves. 7- Apply different integration rules to determine the volume of solid using Disk and Washer methods. 8- Understand polar coordinates and their properties. 9- Apply the concept of polar coordinates to solve integration applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Fundamental Concepts of complex numbers. • Complex numbers properties- power and roots • Inverse Trigonometric function and their differentiation • Inverse Trigonometric function Integration • Hyperbolic Trigonometric functions and their differentiation • Hyperbolic Trigonometric functions integration • Methods of integration – Integration by Part • Methods of integration - Partial fraction method • Methods of integration – Integration using substation • Integration applications – Area under curve • Integration applications – Area between two curves • Integration applications – Volume of solid using Disk method • Integration applications – Volume of solid using Washer methods • Polar coordinates and its properties
	• Area under curve in Polar coordinates • Area between two curves in Polar coordinates • Length of curve in Polar coordinates.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) 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	15% (15)	5 and 10	LO #2, #3 and #5, #6
	Assignments	2	15% (15)	2 and 12	LO #1 and #5
	Report	1	10% (10)	13	LO # 3, #4, #5, and #6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	Fundamental Concepts of complex numbers.
Week 2	Complex numbers properties- power and roots
Week 3	Introduction to Inverse Trigonometric function and their differentiation
Week 4	Inverse Trigonometric function Integration
Week 5	Introduction to Hyperbolic Trigonometric functions and their differentiation
Week 6	Hyperbolic Trigonometric functions integration
Week 7	**Mid-term Exam**
Week 8	Methods of integration – Integration by Part and integration using Partial fraction method
Week 9	Methods of integration – Integration using substation
Week 10	Integration applications – Area under curve and Area between two curves
Week 11	Integration applications – Area between two curves
Week 12	Integration applications – Volume of solid using Disk and Washer methods
Week 13	Introduction to polar coordinates and its properties
Week 14	Integral applications using polar coordinates – Area and length of curve
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	

Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017.	Yes
Recommended Texts	Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014.	yes
Websites	https://www.coursera.org/learn/ calculus I	

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 Electrical Circuits II**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE12305				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	Asst. lect Hikmat Maad		**e-mail**	hikmat.maad@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Fundamentals of Electrical Circuits I	**Semester**	1
Co-requisites module	None	**Semester**	

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

Module Objectives أهداف المادة الدراسية	1- Understand the concept of impedance and apply it to analyze AC circuits, including calculating voltage and current phasors, and determining impedance values for capacitors and inductors. 2- Apply network theorems such as Thevenin's theorem, Norton's theorem, and superposition theorem to simplify complex AC circuits and calculate unknown quantities. 3- Calculate and analyze power in AC circuits, including real power, reactive power, apparent power, and power factor. Apply power factor correction techniques and calculate power losses and efficiency. 4- Analyze and solve series and parallel resonance circuits, including determining resonant frequency, bandwidth, quality factor, and understanding the frequency response characteristics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- AC Circuit Components: Students should learn about AC Generation and circuit components such as capacitors, inductors. They should understand their behavior in AC circuits, including the calculation of reactance, impedance, and power dissipation 2- AC Circuit Analysis: Students should develop a thorough understanding of alternating current (AC) circuits and their analysis. They should be able to apply concepts such as impedance, phasors, and complex numbers to analyze AC circuits, including calculating voltage and current phasors, power factor, and reactive power. 3- Circuit Analysis Techniques: Building upon the skills learned in Electric Circuit I, students should further develop their circuit analysis techniques. They should be able to analyze complex AC circuits using nodal analysis, mesh analysis, and various network theorems such as superposition, Thevenin, and Norton. 4- Power Analysis: Students should learn about power calculations in AC circuits, including real power, reactive power, and apparent power. They should understand power factor correction techniques and be able to calculate power losses and efficiency in AC circuits. 5- Resonance and Frequency Response: Students should understand the concept of resonance in AC circuits and be able to analyze series and parallel resonance circuits. They should be able to calculate resonant frequency, bandwidth, and quality factor, and understand the frequency response of different circuits. 6- Laboratory Skills: Depending on the course, students may have the opportunity to apply their theoretical knowledge through hands-on laboratory experiments. They should further develop skills in using measurement instruments, constructing and analyzing AC circuits, and verifying theoretical concepts through practical experiments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Introduction to AC Circuits: - Review of basic concepts: voltage, current, and resistance - Characteristics of AC voltage and current waveforms - RMS, peak, and average values of AC quantities - Phase relationship between voltage and current in AC circuits 2- Impedance and Phasor Analysis: a. Definition and calculation of impedance b. Representation of AC quantities using phasor diagrams

	- Complex numbers and their application in AC circuit analysis - Series and parallel impedance combinations in AC circuits 3- AC Circuit Analysis Techniques: a. Application of Kirchhoff's laws (KCL and KVL) in AC circuits b. Nodal analysis and mesh analysis in AC circuits 4- Power Analysis in AC Circuits: a. Real power, reactive power, and apparent power in AC circuits b. Power factor and power factor correction techniques c. Calculation of power losses and efficiency in AC circuits 5- Resonance and Frequency Response: a. Series and parallel resonance in AC circuits b. Calculation of resonant frequency, bandwidth, and quality factor c. Frequency response of AC circuits and its analysis 6- Review and Assessment: a. Review of key concepts and techniques b. Practice problems and exercises c. Summative assessments (quizzes, tests, or exams)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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 and 10	
	Assignments	2	10% (10)	8 and 11	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	Midterm Exam	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Sinusoidal Alternating Current, AC Generation, Average Value
Week 2	RMS value, Response of Basic R, L, and C Elements to a Sinusoidal Voltage or Current
Week 3	Frequency response of the basic elements, Complex Number, Phasors
Week 4	Series Configurations in AC Circuits
Week 5	Parallel Configuration in AC Circuits
Week 6	Mesh & Nodal in AC
Week 7	Mid-course Exam
Week 8	Network Theorems in AC circuits: Superposition ,
Week 9	Thevenin's and Norton's theorems
Week 10	Power in AC circuits: Average power and power factor
Week 11	Reactive power , apparent power, and power triangle
Week 12	Power factor correction

Week 13	Resonance: series resonance, The Quality Factor (Q), resonance bandwidth
Week 14	Parallel resonance, parallel resonance Frequency
Week 15	Parallel resonant bandwidth, examples
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Capacitive and Inductive Reactance
Week 2	Lab 2: Resistor & Inductor in Series
Week 3	Lab 3: Resistor & Capacitor in Series
Week 4	Lab 4: Resistor, Inductor & Capacitor in parallel
Week 5	Lab 5: Series-parallel Resistor, Inductor & Capacitor circuits
Week 6	Lab 6: AC superposition
Week 7	Lab 7: Series Resonance circuits

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Introductory circuit Analysis; by Robert L. Boylestad	Yes
Recommended Texts	Sadiku, Matthew NO, and Charles K. Alexander. Fundamentals of electric circuits. New York: McGraw-Hill, 2009.	No
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	**Electronic Physics**			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE12302				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Asst.lect Buraq Karim		**e-mail**	buraq.k.shebli@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/2/2026		**Version Number**	1	
Relation with other Modules العلاقة مع المواد الدراسية الأخرى					
Prerequisite module	none			**Semester**	
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: 1. enable the student to have a solid background in electronic physics 2. enable the student to have a solid background in the analysis of the characteristics and circuits of diode and zener diode. 3. the student will learn the specifications and applications of the diode and zener diode.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Will be able to tell theory of semiconductors: Explains an atom and basic terms related with an atom. 2. Recognizes conductor, semiconductor, and insulator and explains characteristics of these materials. 3. Recognizes p and n type materials and explains characteristics of these materials. 4. Will be able to recognize types of diode, explain basic terms related with diodes and tell the operating principle of diodes 5. Will be able to analyze different diode circuits. 6. Recognizes half-wave, full-wave and bridge rectifier circuits and explains the operation of these circuits. 7. Recognizes clipping and clamping circuits, explains the operation of these circuits and analyses these circuits. 8. Analyzes and measures parameters in basic diode circuits.
Indicative Contents المحتويات الإرشادية	1- Will be able to tell theory of semiconductors. - Explains an atom and basic terms related with an atom. - Recognizes conductor, semiconductor, and insulator and explains characteristics of these materials. - Recognizes p and n type materials and explains characteristics of these materials. 2- Will be able to recognize types of diode, explain basic terms related with diodes and tell the operating principle of diodes. - Recognizes types and the construction of diodes. - Explains ideal diode, equivalent circuit and dc characteristic of a diode. - Tells the operating principles of diodes and zener diodes.
	3- Will be able to analyze different diode circuits. - Recognizes half-wave, full-wave and bridge rectifier circuits and explains the operation of these circuits. - Recognizes clipping and clamping circuits, explains the operation of these circuits and analyses these circuits. - Analyzes and measures parameters in basic diode circuits.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	

Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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**	3	30% (30)	4,9,10	LO #1, 2,3, 4 and 5
	Assignments	2	10% (10)	10,14	LO # 7 and 8
Summative assessment	**Midterm Exam**	2 hr	10% (10)	6	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction:** Atomic structure & electronic state (orbit, energy and valence) of electron.
Week 2	semiconductors, conductors and isolators, effects of temperature on depletion layer and P-N junction.
Week 3	**Characteristics of Diode:** forward and reverse bias and its relations.
Week 4	the diode operation and its conditions.
Week 5	zener region in terms of voltage and power dissipations, DC & AC resistance.
Week 6	Mid-Term Exam
Week 7	**Specifications of diode:** diode capacitance, reverse recovery time
Week 8	diode measuring and testing
Week 9	**Diode applications:** load line analysis,
Week 10	series diode configuration
Week 11	parallel & series configurations
Week 12	half – wave rectifier and peak reverse voltage
Week 13	full wave rectifier and related circuits (biased, diode clippers and clampers)
Week 14	zener diode and its applications
Week 15	**Review**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:

Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.	yes
Recommended Texts	" Electronic Devices", By Floyd. 9th ed.	yes
Websites		

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	**Workshop**			**Module Delivery**	
Module Type	**B**			☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☒**Practical** ☐**Seminar**	
Module Code	COE12303				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department			**College**		
Module Leader			**e- mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

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

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

Module Objectives أهداف المادة الدراسية	A. Introduce students the basics of electrical and electronic devices, tools and circuits. B. Introduce students the basics of joining; welding and soldering processes. C. Introduce students to the basics of the electrical device and circuits with improving the skills that deal with methods of measurement and standardization. D. Introduce students to the basics of transformers, types and design. E. Introduce students to the basics of capacitors include the charging and dis charging circuits and the methods of test. F. Introduce students to the industrial electrical and skill of using tools and design of electrical circuits and control panels. G. Introduce students to the basics of the welding arts and installation of metal and the types of welding machines and skills to deal with the kinds of welding and measurement methods and standardization. H. Developing student skills in welding and soldering operations. I. Making students dealing with the problem and damage circuits to repair and fix it.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Acquire knowledge and understanding 2- Preparation of practical engineers in the field of electrical, network and computer engineering who are characterizing by a high level of knowledge and technological innovation, and work in with internationally approved discreet standards of quality assurance and academic accreditation of corresponding engineering programs with a commitment to ethics of engineering career. 3- learn and understand risk factors surrounding it enabled. 4- learn and understand some of the theoretical principles. 5- To be able subject-specific skills 6- To be able discussion and dialogue. 7- Brain storming by encouraging students to produce a large number of ideas about some issue or problem raised during the job. 8- Self-learning by teaching the student by his own according to his special abilities and mental and cognitive levels responding to his preferences and interests to achieve development and integration of his capabilities. 9- Cooperative learning by team working.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** Occupational Safety and importance ;(1 week) Tools and Devices; (1 week) Test methods; (1 week)

	Design and supply; (2 week) Welding and soldering processes; (2 weeks) Transformers and rectification circuits; (4 weeks) Capacitors and charging and discharging circuits; (3 weeks) Mini projects ; (1 weeks)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	No two days are the same and what might have worked once in a classroom, might not work again. Switching between teaching strategies to suit the needs of the learners is a great way to ensure that the learners are meaningfully engaged and actively participating in the classroom. 1- Visualization is very simply put, the ability to create mental images based on the words we hear or the text that we read. Some of the methods of implementing this strategy in the classroom include: - Use of audio visual aids like photos, videos, audio clips, songs etc - Diagrams, charts and mind maps - Modeling as you teach for the visual learners who might need to see a visual representation to understand as opposed to hearing the concept being explained. 2- Virtual learning has led educators to understand the importance of a key part of the learning process – cooperation. 3- Cooperative learning is an instructional strategy in which a small group of students collaboratively work on a given task. The task can be as simple as solving a quiz or as complex as writing a story.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the basics occupational Safety and importance and understanding the rules of Electrical Safety Principles.
Week 2	Understanding the principles of resistors and ohms law and design circuits.
Week 3	Understanding the principles of capacitors and the methods of test.
Week 4	Design and supplying charging and dis-charging circuits with required data.
Week 5	Understanding and learning all about AVO meter and how it's used.
Week 6	Understanding the principles of transformer and the methods of test.
Week 7	Design and supplying the rectification circuits.
Week 8	Introduction to; Semiconductors, diode, power diode, zener diode, LED diode; learning about every means
Week 9	Testing all diode types and designing circuits
Week 10	practical work
Week 11	practical work
Week 12	practical work
Week 13	practical work of welding process
Week 14	Work on small mini projects such as design a mini power supply
Week 15	Preparing a report about all subjects including a practical work

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: occupational Safety in workshop
Week 2	Lab 2: how to use tools and devices
Week 3	Lab 3: how to use AVO meter
Week 4	Lab 4: checking the resistors and coding
Week 5	Lab 5: design a parallel and series circuits
Week 6	Lab 6: checking the transformers
Week 7	Lab 7: designing the rectification circuits part 1
Week 8	Lab 8: designing the rectification circuits part 2
Week 9	Lab 9: welding processes: practical exercises
Week 10	Lab 10: soldering processes: practical exercises
Week 11	Lab 11: testing diode and zener diode
Week 12	Lab 12: testing LED diode
Week 13	Lab 13: supplying the mini power supply made by students as a small project

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Technical workshop (Materials & Devices) authored by Mazin N. Ali, 2016. Electrical & Electronics Engineering, Amrita School of Engineering, 2014 Electronics Workshop Lab Manual, Polytechnic, Bilaspur, 2010	yes
Recommended Texts	Engineering Workshop Data. A Book of Reference containing Data, Formulae, Tables, hints and Recipes relating to all Phases of Engineering Workshop Practice. Hardcover – 1 Jan. 1947.	No
Websites	https://www.slideshare.net/JosephKonnully/workshop-practise	

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	Arabic Language			**Module Delivery**	
Module Type	B			☒ **Theory**	
Module Code	ENG133			☐ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	2	
Administering Department			**College**		
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	١- تُعَدُّ اللغةُ العربيةُ وسيلةً للتواصل، فهي تحمل رسالةً بين المتكلمين، ولكي تكون هذه الرسالة واضحةً ومفهومةً يجب أن يكون ترتيبُ مفرداتها حسبَ التركيبِ القواعديّ لتلك اللغة. ومن هنا برزت وبشكلٍ ضرورةُ تدريسِ القواعدِ أو النحوِ في كلّ اللغات. ٢- تعريفُ الطالبِ بمهاراتِ الكتابةِ والتعبير، والوقوفُ على مواطنِ الخطأ لتصويبِ النطقِ الصحيح. ٣- إتقانُ مهارةِ الكتابةِ الصحيحةِ بمعرفةِ قواعدِ الإملاء، ولا سيما مواضعُ الأخطاءِ الشائعة. ٤- الحفاظُ على اللغةِ العربيةِ كونَها لغةَ القرآنِ الكريم. ٥- التعريفُ بالمبادئِ الأساسيةِ للغةِ العربيةِ من خلالِ تنميةِ المهاراتِ الكتابيةِ والتعبيرِ والمحادثة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1--اكتسابُ الطالبِ معرفةَ المفاهيمِ الأساسيةِ للغةِ العربيةِ وتطبيقِها من خلالِ الأمثلة.** **2-معرفةُ كتابةِ الكلامِ الصوتيّ بشكلٍ مضبوطٍ من حيثُ الأصواتُ الصحيحةُ أو المعتلة.** **3-دراسةُ الطالبِ موضوعَ العددِ ومعرفةُ كيفيةِ كتابتِه بالشكلِ الصحيح.** **4-تمكينُ الطالبِ من إيجادِ الحلولِ المناسبةِ والصحيحةِ للمشكلاتِ الحقيقيةِ المعقَّدة، وتنميةُ الحسِّ الفكريّ من خلالِ إعطاءِ أمثلةٍ للغةِ العربيةِ وتطبيقِها.** **5-تكليفُ الطلبةِ بكتابةِ البحوثِ والتقاريرِ لاختبارِ مدى استيعابِهم للقواعدِ الأساسيةِ للغةِ العربيةِ وتطبيقِها في حياتِهم اليومية.**
Indicative Contents المحتويات الإرشادية	**1-إرشادُ الطلبةِ إلى تكوينِ خزينٍ معرفيّ من أنظمةِ اللغةِ وأحكامِها وقواعدِها الأساسية.** **2-إرشادُ الطلبةِ إلى اكتسابِ مهاراتِ اللغةِ الأساسيةِ والتدرّبِ عليها من خلالِ التطبيقِ العمليّ كتابةً ونطقًا.** **3-إرشادُ الطلبةِ إلى الاطلاعِ على النصوصِ من الشعرِ والنثرِ بمختلفِ العصور، ومحاكاتِها في كتابةِ النصوصِ التي تُعبّر عن حياتِهم اليوميةِ ومشاعرِهم وعواطفِهم الذاتية.** **4-إرشادُ الطلبةِ إلى ما يُؤدّي إلى تعزيزِ مهاراتِهم والانتقالِ بها إلى مستوى التفكيرِ العالي.** **5-إرشادُ الطلبةِ إلى التعبيرِ عن أفكارِهم من خلالِ تكوينِ مجموعاتٍ والتنافسِ فيما بينهم.**

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1-أفضلُ طريقةٍ في تعليمِ الطلبةِ النحوَ العربيَّ لأهميتِه في تعلّمِ هذه اللغةِ وأهميتِه في الترجمة، هي اتباعُ مبدأِ التعلُّمِ التعاوني؛ على أن يتعاونَ الطلابُ في تهيئةِ مادةِ الدرسِ وتقديمِها بعد تقسيمِهم إلى مجاميع، تهتمُّ كلُّ مجموعةٍ بجانبٍ من مادةِ الدرس. 2-إلقاءُ المحاضراتِ النظريةِ بشكلٍ مباشرٍ على السبورة. 3-عملُ بحوثٍ وتوزيعُها على مجاميعَ طلابيةٍ لمعرفةِ مدى فهمِهم للمادةِ أو إدراكِهم لها. 4-تُعدُّ الطريقةُ الاستقرائيةُ القائمةُ على استنباطِ القاعدةِ من الأمثلةِ طريقةً ناجحةً في تدريسِ النحو. 5-من أهمِّ طرائقِ التعلُّمِ والتعليمِ استراتيجيةُ مهاراتِ التفكيرِ ضمنَ مجموعة. 6-كما تُعدُّ استراتيجيةُ التفكيرِ الناقدِ في التعلُّم، ومن طرائقِها العصفُ الذهني، من أهمِّ الأساليبِ التعليمية.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	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	مقدمة عن علامات الترقيم والتعرّف على أنواعها
Week 2	كتابةُ أنواعِ الهمزةِ: همزةُ القطعِ والوصلِ، والهمزةُ المتوسطةُ، والهمزةُ المتطرفةُ.
Week 3	مكمِّلاتُ ضوابطِ الكتابةِ: التنوينُ، والشدةُ، والمدّةُ، والتعرُّفُ على أنواعِ الأخطاءِ اللغوية.
Week 4	موضوع العدد وطريقة كتابتة
Week 5	الخط العربي وانواعه
Week 6	المشتقات (اسم الفاعل و السم المفعول وأسماء الزمان والمكان واسم الالة)
Week 7	الفعل وانواعه
Week 8	الفاعل والمفعول به

Week 9	امتحان الفصل
Week 10	المبتدأ والخبر
Week 11	المثنى والجمع
Week 12	الفرق بين التاء والهاء
Week 13	التذكير والتأنيث
Week 14	المعلقات
Week 15	مراجعة
Week 16	الاختبار النهائي

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	- **الوجيز في اللغة العربية**، محيي هلال سرحان. - **شرح قطر الندى وبل الصدى**، لابن هشام الأنصاري. - **الآجرومية**، لأبي عبد الله محمد الصنهاجي. - **الإملاء والترقيم في الكتابة العربية**، لعبد العليم إبراهيم. - **اللغة العربية لغير المختصين**، لمصطفى جطل وصلاح كزارة.	Yes
Recommended Texts	- **جامع الدروس العربية**، لمصطفى الغلاييني. - **معاني النحو**، لفاضل السامرائي. - **دراسة في قواعد الإملاء**، للدكتور عبد الجواد الطيب. - **موسوعة الشامل في الكتابة والإملاء**، لموسى حسن الهديب.	No
Websites	1. https://shamela.ws/ 2. https://waqfeya.net/	

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	**Communication Fundamentals I**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE21303				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII2		**Semester of Delivery**	3	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Asst.Lect Jaafar Ali		**e-mail**	jaafar.ali@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

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

Module Objectives أهداف المادة الدراسية	1. 2. Understanding Communication Systems: The subject aims to provide a fundamental understanding of analog communication systems. Students learn about the key components, concepts, and principals involved in the transmission and reception of signals in communication systems. 3. Signal Representation and Analysis: The subject focuses on the study of different signal representations, including continuous-time signals. Students learn to analyze signals using techniques such as Fourier transform. 4. Analog Communication Systems: The subject covers the principles and techniques used in analog communication systems. Students learn about modulation techniques, such as amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM). They also study demodulation techniques and the impact of noise on analog signals.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of Communication Systems: Gain a comprehensive understanding of the basic concepts and principles underlying analog communication systems. 2. Knowledge of Signal Representation: Acquire knowledge of various methods for representing analog signals, including time-domain and frequency-domain representations. 3. Familiarity with Analog Modulation Techniques: Gain an understanding of different analog modulation techniques such as amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM). Understand the advantages, disadvantages, and applications of each technique. 4. Understanding of Noise and Channel Capacity: Learn about the effects of noise on communication systems and methods for mitigating its impact. Gain an understanding of channel capacity, bandwidth, and signal-to-noise ratio (SNR) calculations.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Analog Communication Fundamentals: 1. Introduction to Analog Communication 2. Basic Concepts of Signals and Systems 3. Amplitude Modulation (AM) a. Amplitude Modulation Process b. Frequency Spectrum of AM Signal c. Modulation Index and Power Relations d. Demodulation Techniques for AM 4. Frequency Modulation (FM) a. Frequency Modulation Process b. Frequency Spectrum of FM Signal c. Deviation Ratio and Power Relations d. Demodulation Techniques for FM 5. Phase Modulation (PM) a. Phase Modulation Process b. Phase Spectrum of PM Signal c. Phase Modulation Index and Power Relations d. Demodulation Techniques for PM 6. Noise and Distortion in Analog Communication a. Types of Noise and Their Characteristics b. Signal-to-Noise Ratio (SNR) c. Noise Figure and Noise Temperature

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Analog Communication Strategies: 1. Signal Conditioning: Analog signals are susceptible to noise and interference. Signal conditioning techniques such as filtering, amplification, and modulation can be used to enhance the quality and integrity of the analog signal before transmission. 2. Bandwidth Optimization: Analog signals require a certain amount of bandwidth for transmission. By employing techniques such as frequency division multiplexing (FDM) or time division multiplexing (TDM), multiple analog signals can be transmitted simultaneously, optimizing the available bandwidth. 3. Noise Reduction: Analog signals are prone to noise, which can degrade the signal quality. Strategies like shielding, grounding, and balanced transmission lines can be used to minimize noise and interference during transmission.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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	20% (20)	5 and 14	LO #1, #2 and #3, #4
	Assignments	2	10% (10)	2 and 14	LO #1, #2 and #3, #4
	Projects / Lab.	1	10% (10)	Continuous	All
Summative assessment	Midterm Exam	2hr	10% (10)	9	LO #1 - #3
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Introduction to Communication Systems

Week 2	Elements of a Communication System and Mode of operations
Week 3	Fundamental Limitations and Modulation and Coding
Week 4	Review of Signal Classifications and Transmission of Signals through Linear Systems
Week 5	Linear modulation strategies that constitute the amplitude modulation family: Amplitude Modulation (AM)
Week 6	Double Sideband-Suppressed Carrier (DSB-SC): modulation and demodulation techniques
Week 7	Single Sideband (SSB): modulation and demodulation techniques
Week 8	super heterodyne receiver
Week 9	Mid-term Exam (from week 1 to week 8)
Week 10	Angle Modulation concepts and the Relationship between PM and FM Waves:
Week 11	Narrow-Band Frequency Modulation
Week 12	Wide-Band Frequency Modulation
Week 13	Transmission Bandwidth of FM Waves and Generation of FM Waves
Week 14	Demodulation of FM Signals
Week 15	Commercial FM transmitter
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction and Overview of the lab equipment
Week 2	Lab 2: Representation of Signals
Week 3	Lab 3: Amplitude Modulation
Week 4	Lab 4: Demodulation of an Amplitude Modulated Signal

Week 5	Lab 5: Generation of Frequency Modulation Signal
Week 6	Lab 6: Demodulation of Frequency Modulation Signal
Week 7	Lab 7: Review for all labs

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	F.G. Stremler, Introduction to Communication Systems, 2nded, 1982 A. B. Carlson, Communication Systems, McGraw Hill, 4thed, 2002	Yes
Recommended Texts	S.S. Haykin, Communication Systems, Wiley, 2001.B Behrouz A. Forouzan, Data communications and networking, 4thed, 2007	yes
Websites	https://www.coursera.org/learn/ analog communication fundamentals	

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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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 Systems Design I**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE21304				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	Asst.lect Aaid Mohammed		**e-mail**	aaid.m.ameer@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

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

Module Objectives أهداف المادة الدراسية	1. Understand the basics of distinguishing sequential logic from combinational logic. 2. Learn the basics of storage elements such as SR Latch and D Latch. 3. Learn the basics of Flip-Flops such as Edge-Triggered D Flip-Flop and other types of Flip-Flops. 4. Understand the behavior of a clocked sequential circuit which is determined from the inputs, the outputs, and the state of its flip-flops. 5. To distinguish between two models of sequential circuits: the Mealy model and the Moore model. 6. Learn the HDL basics which describes the functionality differently, by language constructs that represent the operations of registers in a machine. 7. Learn the state reduction and assignment design procedure 8. Understand the principles of different types of registers and counters, their working, and their storage characteristics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of basic of sequential logic: Students should gain a solid understanding of sequential logic circuit and their difference from combinational logic circuits that have been studied in the previous level. 2. Analysis of sequential logic circuits: Students should be able to analyze and write the truth tables, the output equations, and final results of sequential logic circuits. 3. Logic circuit components and their behavior: Students should learn about various circuit components such as Flip-Flops and registers. 4. Circuit analysis techniques: Students should develop skills in circuit analysis techniques, including using circuit diagrams, identifying circuit elements, and applying systematic problem-solving approaches. They should be able to analyze simple and complex logic circuits to determine output. 5. Laboratory skills: Depending on the course, students may have the opportunity to apply their theoretical knowledge through hands-on laboratory experiments. They should develop skills in using measurement instruments, constructing circuits, and verifying theoretical concepts through practical experiments.
Indicative Contents المحتويات الإرشادية	1. Indicative content includes the following. 2. Introduction to Synchronous Sequential Logic [5Hours] 3. Storage Elements: Latches [5Hours] 4. Storage Elements: Flip-Flops [5Hours] 5. Analysis of Clocked Sequential Circuits [5Hours] 6. Synthesizable HDL Models of Sequential Circuits [5Hours] 7. State Reduction and Assignment [5Hours] 8. Design Procedure [5Hours]

	9. Mid-course Exam [2Hours for theoretical exam and 1 hour for practical exam] 10. Registers [5Hours] 11. Shift Registers [5Hours] 12. Universal Shift Register [5Hours] 13. Ripple Counters [5Hours] 14. Synchronous Counters [5Hours] 15. Other Counters [5Hours] 16. HDL for Registers and Counters [5Hours] 17. Review and Assessment: [5Hours]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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**	2	10% (10)	5 and 10	LO #1, #2 and #3
	Assignments	2	10% (10)	7 and 14	LO #3 and #4
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Synchronous Sequential Logic
Week 2	Storage Elements: Latches
Week 3	Storage Elements: Flip-Flops
Week 4	Analysis of Clocked Sequential Circuits
Week 5	Synthesizable HDL Models of Sequential Circuits
Week 6	State Reduction and Assignment
Week 7	Design Procedure
Week 8	Mid-course Exam

Week 9	Registers
Week 10	Shift Registers
Week 11	Universal Shift Register
Week 12	Ripple Counters
Week 13	Synchronous Counters
Week 14	Other Counters
Week 15	HDL for Registers and Counters
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
Week 2	Lab 2: Design of AND, OR, and NOT logic gates using VHDL
Week 3	Lab 3: Design of NAND, NOR, XOR, and XNOR logic gates using VHDL
Week 4	Lab 4: Design of flop-flops using VHDL
Week 5	Lab 5: Design of shift register using VHDL
Week 6	Lab 6: Design of counter using VHDL
Week 7	Lab 7: Design of ripple counter using VHDL

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Digital Design: with an introduction to Verilog HDL by M. Morris Mano and Mechael D. Ciletti, 5th Edition, Pearson Education, 2013.	Yes
Recommended Texts	Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Prentice Hall, 2015.	Yes
Websites	https://onlinecourses.nptel.ac.in/noc21_ee39/preview	

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	**Electronics I**			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE21306				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Computer engineering	**College**	College of engineering	
Module Leader	Dr.Dhamyaa Husam		**e-mail**	Dhamyaa.husam@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/10/2025		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**Electronic Physics**	**Semester**	Two
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: 1- enable the student to have a solid background in physical structure of BJT 2- enable the student to have a solid background in physical structure of FET transistors 3- enable the student to analyze the circuits of the BJT and FET transistors.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. the student will be able to tell the structure and the operation of transistors 2. the student will recognize the different types of transistors. 3. The student will recognizes the different configurations of circuits with transistors and the characteristics of these circuits and compares these circuits. 4. Analyzes transistor dc biasing. 5. Explains the operation of transistor dc biasing circuits. 6. Will be able to explain different circuits with transistors.
Indicative Contents المحتويات الإرشادية	- Will be able to tell the structure and the operation of transistors and recognize the different types of transistors. - Recognizes the different configurations of circuits with transistors and the characteristics of these circuits and compares these circuits. - Analyzes transistor dc biasing. - Explains the operation of transistor dc biasing circuits. - Will be able to explain different circuits with transistors.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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	30% (30)	3,5,12	LO #2,3 and 5
	Assignments	2	10% (10)	6,13	LO # 3 and 6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to transistor structure**
Week 2	transistor structure and its operations
Week 3	Analysis of currents.
Week 4	**Configuration of transistor:** bias configuration of a common- base
Week 5	bias configuration of a common- emitter
Week 6	bias configuration of a common- collector
Week 7	Mid-Term Exam
Week 8	**Transistor amplifications, The operation of transistor and its limitations.**
Week 9	**DC biasing circuit and its characteristics.**
Week 10	**Voltage divider, emitter stabilize and voltage feedback,**
Week 11	**Common- base and emitter follower configurations,**
Week 12	**Saturation level of transistor,**
Week 13	**Transistor switching configuration.**
Week 14	**FET construction, and biasing circuits**
Week 15	**review**
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: dc analysis of common emitter transistor
Week 2	Lab 2: dc analysis of voltage divider transistor

Week 3	Lab 3: dc analysis of emitter follower transistor
Week 4	Lab 4: dc analysis of common base transistor
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.	yes
Recommended Texts	" Electronic Devices", By Floyd. 9th ed.	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

Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mathematics**			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	COE21302			☐ **Lecture**	
ECTS Credits	4			☐ **Lab**	
SWL (hr/sem)	**100**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Asst.Lect Hasan Mohammed		**e-mail**	hasan.m.khalil@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	01/10/2025		**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 Objectives أهداف المادة الدراسية	1. Partial derivatives are useful in analyzing surfaces for maximum and minimum points and give rise to partial differential equations in next stage. 2. Learn basics of vectors for many engineering quantities, such as forces, displacements, velocities, and accelerations, will need to be represented as vectors for analysis. 3. The major applications of multiple integrals in engineering is the determination of properties of plane, and whenever an area or a volume under a 2D curve (a surface) needs to be measured 4. Build a mathematical toolkit: The course introduces various mathematical tools and techniques necessary for engineering analysis. This includes a. impart the knowledge of sequences and summation of series b. Represent functions as Taylor and Maclaurin series. 5. Understand their engineering application
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	6. To evaluate partial derivatives and can implement to estimate maxima and minima of multivariable function 7. Understand the formula for the chain rule 8. Use the chain rule to find derivatives of composite functions 9. Apply the chain rule to a composition of three or more functions 10. View vectors geometrically 11. Find magnitude and direction 12. Perform vector addition and scalar multiplication 13. Find the component form of a vector 14. Find the unit vector in the direction of v 15. Perform operations with vectors in terms of i and j 16. Find the dot product of two vectors 17. Finding the equations of a line and of a plane 18. Evaluate a double integral
	19. Setting up triple integrals for a region 20. Understanding the definition of a sequence 21. define what it means for a series to converge or diverge 22. Classifying a sequence as finite or infinite 23. Classifying a sequence as geometric, or neither 24. Learn to represent functions as Taylor and Maclaurin series.

Indicative Contents المحتويات الإرشادية	• PARTIAL DERIVATIVES Functions of Two or More Variables The Chain Rule Directional Derivatives and Gradients Tangent Planes and Normal Vectors Local Maxima and Minima of Functions of Two Variables • VECTORS Dot Prod uct Cross Prod uct Plane s in Space • VECTOR-VALUED FUNCTIONS Introduction to Vector-Valued Functions • MULTIPLE INTEGRALS Double Integrals Double Integrals in Polar Coordinates Triple Integrals • Sequences Infinite Series Geometric Series Converge nce Tests The Comparison, Ratio, and Root Tests Maclaurin and Taylor Series

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1- Giving theoretical lectures 2- Solve many problems 3- Using illustration methods such as drawing 4- Direct discussion by asking questions and opening dialogue and interaction with students. 5- Giving video lecture if need

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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	20% (20)	Continuous	All
	Assignments	2	10% (10)	Continuous	All
	Report	1	10% (10)	11,12	LO #13 , LO #14
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fourier series - introduction.
Week 2	Half range Fourier series
Week 3	Partial derivatives
Week 4	Chain rule
Week 5	Maxima, minima, and saddle points
Week 6	Vectors: Introduction
Week 7	Vectors: properties, dot product
Week 8	Vectors: cross product
Week 9	(Mid-term Exam)
Week 10	Equations of lines and planes in space
Week 11	Vector function
Week 12	Multiple Integrals: Double Integrals
Week 13	Double Integrals using polar coordinate
Week 14	Triple integrals
Week 15	Taylor and Maclaurin series
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus By Thomas	Yes
Recommended Texts	CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS , STEPHEN DAVIS	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	**Object Oriented Programming**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE21301				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Computer engineering	**College**	Collage of engineering	
Module Leader	Asst.Lect Batool Rafid		**e-mail**	batool.r.natiq@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand Object-Oriented Programming concepts and techniques. 2. Understand the principles of software engineering in Object-Oriented languages. 3. Understand the fundamentals of programming in C++. 4. Ability to design and implement Object-Oriented software to solve moderately complex problems. 5. Ability to write good program documentation. 6. Become familiar with the relationship between classes and objects. 7. Understand and learn how to create functions with different types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Know the basic characteristics of C++ programming. 2. Analyze the problem and solve it with object oriented programming. 3. Understand the role that functions play in an object-oriented program. 4. Enable the student to know the principle of Classes and the benefits of the objects. 5. Enabling the student to know the principle of inheritance and a simple degree of polymorphism. 6. Enabling the student to acquire overload skills 7. Enable the student to acquire the skills of writing a private function and Public Function writing. 8. Analyze a problem and determine what problem elements to represent as functions or objects. 9. Apply object-oriented Programming fundamental techniques to develop small scale applications. 10. Trace, analyze, validate and deduce the output of given program code of different complexities.
Indicative Contents المحتويات الإرشادية	1. Giving the theoretical lectures. 2. Attendance education in laboratory lessons and implementation of the prescribed programs. 3. Using illustrations through lectures. 4. Direct discussion by asking questions and opening the door for dialogue and interaction with students. 5. Analysis of a computer program to solve real-world problems based on object-oriented principles. 6. Develop and enhance the student's thinking skill and move him to a higher level of thinking. 7. Creating confidence in the student to design and implement object- oriented programming to solve practical applied problems.

	8. Raise the spirit of cooperation and work within a team. 9. Bring out creative ideas among students by raising the spirit of competition. 10. Group thinking skill strategy. 11. Critical thinking strategy in learning. 12. Brainstorming. 13. Application software. 14. Student feedback.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Work effectively as an individual and as a member of a team 2. Demonstrate efficient IT capabilities 3. Developing capabilities and skills to gain the required level of experience and knowledge for the purposes of employment and personal development. 4. Enable the student to link the course outcomes with practical life. 5. Organized and effective planning for program design.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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 and 10	LO #2, #3 and #5, #7
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #2 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction C++ basics, Loops, and decisions.
Week 2	Arrays, Multidimensional Arrays, C-Strings, and The Standard C++ String.
Week 3	Structures, and The Address-of Operator &, and Pointer Variables.
Week 4	Functions, Overloaded Functions, and Inline Functions.
Week 5	C++/Object-Oriented concepts: objects, classes, reusability, inheritance, information hiding, encapsulation, and polymorphism.
Week 6	Objects, Classes, Member Functions
Week 7	Private Member Functions, Constructors and Destructors.
Week 8	Mid-course Exam
Week 9	Friend Function, Friend Class, and Array of Object.
Week 10	Operator Overloading, and this Pointer.
Week 11	Inheritance, Public and Private Inheritance, Class Hierarchies, and Multiple Inheritances.
Week 12	Encapsulation: Private, Public, and Protected Members Variables and Functions.
Week 13	C++ legacy code topics, C++ Templates, and standard template library.
Week 14	Fundamental Algorithms in C++ for searching and sorting such as find, sort, search, count, and merge.
Week 15	Member Functions with Vector: push_back(), size(), swap(), empty(), back(), and pop_back().
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: C++ Programming Basics and Loops and Decisions
Week 2	Lab 2: Arrays, Strings, Structures, and Pointers.
Week 3	Lab 3: Functions.
Week 4	Lab 4: Objects and Classes.
Week 5	Lab 5: Friend Function and Operator Overloading.
Week 6	Lab 6: Inheritance.
Week 7	Lab 7: C++ Templates and Algorithms.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Robert Lafore, Object-Oriented Programming in C++ , Sams Publishing, 4th Edition,	No
Recommended Texts	- Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, C++ Primer, Addison-Wesley Professional; 5th edition, ISBN-10: 0321714113, or ISBN-13: 978-0321714114 - Bjarne Stroustrup, The C++ Programming Language, Addison- Wesley Professional, 4th Edition, ISBN-10: 0321563840 ISBN- 13: 978-0321563842	No
Websites	https://www.w3schools.com/cpp/default.asp https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/	

Grading Scheme

مخطط الدرجات

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

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

Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Communication Fundamentals II**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE22303				
ECTS Credits	4				
SWL (hr/sem)	**125**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Asst.Lect Jaafar Ali		**e-mail**	jaafar.ali@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**Communication Fundamentals I**	**Semester**	Three
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Digital Communication Systems: The subject introduces students to digital communication systems and the underlying concepts. They learn about various modulation schemes used in digital communications, such as phase shift keying (PSK), frequency shift keying (FSK), and frequency shift keying (FSK). The subject also covers, digital modulation, and demodulation. 2. Channel Capacity and Information Theory: Students gain an understanding of channel capacity, which measures the maximum data rate that can be reliably transmitted over a communication channel. 3. Performance Analysis: The subject includes the analysis of communication system performance metrics, such as signal-to-noise ratio (SNR), bit error rate (BER), and bandwidth efficiency. Students learn how to evaluate and compare the performance of different modulation schemes and communication system configurations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of Communication Systems: Gain a comprehensive understanding of the basic concepts and principles underlying digital communication systems. 2. Understanding of Digital Modulation Techniques: Learn about digital modulation techniques such as amplitude shift keying (ASK), frequency shift keying (FSK), phase shift keying (PSK), and quadrature amplitude modulation (QAM). Understand the principles behind these techniques and their applications in digital communication systems. 3. Familiarity with Digital Demodulation: Acquire knowledge of demodulation techniques used to extract the original information from modulated analog and digital signals. Understand the principles behind envelope detection,

	frequency demodulation, and phase demodulation. 4. Understanding of Noise and Channel Capacity: Learn about the effects of noise on communication systems and methods for mitigating its impact. Gain an understanding of channel capacity, bandwidth, and signal-to-noise ratio (SNR) calculations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Digital Communication Fundamentals: 1. Pulse Modulation Techniques a. Introduction to Pulse Modulation b. Pulse Amplitude Modulation (PAM) c. Pulse Width Modulation (PWM) d. Pulse Position Modulation (PPM) 2. Noise and Distortion in Analog Communication a. Types of Noise and Their Characteristics b. Signal-to-Noise Ratio (SNR) c. Noise Figure and Noise Temperature 3. Introduction to Digital Communication a. Binary Code Representations b. Pulse Code Modulation (PCM) c. Differential Pulse Code Modulation (DPCM) d. Delta Modulation (DM) 4. Baseband and Bandpass Digital Transmission a. Line Coding Techniques b. Baseband Transmission Schemes c. Bandpass Transmission Schemes d. Nyquist Criteria for Zero Intersymbol Interference 5.Digital Modulation Techniques a. Amplitude Shift Keying (ASK) b. Frequency Shift Keying (FSK) c. Phase Shift Keying (PSK) d. Quadrature Amplitude Modulation (QAM) 6.Error Detection and Correction

	a. Types of Errors in Digital Communication b. Parity Check and Hamming Code c. Cyclic Redundancy Check (CRC) d. Forward Error Correction (FEC) Techniques 7. Multiplexing Techniques a. Frequency Division Multiplexing (FDM) b. Time Division Multiplexing (TDM) c. Code Division Multiplexing (CDM) d. Orthogonal Frequency Division Multiplexing (OFDM) 8. Digital Communication Channels and Noise a. Channel Capacity and Shannon's Theorem b. Bit Error Rate (BER) and Signal-to-Noise Ratio (SNR) c. Error Performance Analysis in Digital Communication Systems d. Equalization Techniques for Mitigating Inter-symbol Interference (ISI)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Digital Communication Strategies: 1. Signal Conditioning: Digital signals are susceptible to noise and interference. Signal conditioning techniques such as filtering, amplification, and modulation can be used to enhance the quality and integrity of the analog signal before transmission. 2. Bandwidth Optimization: Digital signals require a certain amount of bandwidth for transmission. By employing techniques such as frequency division multiplexing (FDM) or time division multiplexing (TDM), multiple analog signals can be transmitted simultaneously, optimizing the available bandwidth. 3. Noise Reduction: Digital signals are prone to noise, which can degrade the signal quality. Strategies like shielding, grounding, and balanced transmission lines can be used to minimize noise and interference during transmission.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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	20% (20)	1, 2 and 3	LO #1, #2 and #3
	Assignments	2	10% (10)	2, 3 and 4	LO #2, #3 and #4
	Projects / Lab.	1	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Digital communication system
Week 2	Transition from Analog to Digital Communications
Week 3	The sampling Theorem, Pulse-amplitude modulation, The quantization process
Week 4	Pulse-code modulation, Delta modulation
Week 5	Multiplexing Systems
Week 6	Frequency-Division Multiplexing, Time-Division Multiplexing
Week 7	Mid-term Exam
Week 8	Digital Band-pass Modulation Techniques
Week 9	Binary Amplitude-Shift Keying
Week 10	Coherent Detection of ASK Signals

Week 11	Noncoherent Detection of ASK Signals
Week 12	Phase-Shift Keying
Week 13	Binary Frequency-Shift Keying (BFSK)
Week 14	FSK Bit Rate, Baud, and Bandwidth
Week 15	Continuous-Phase Frequency-Shift Keying
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction and Overview of the lab equipment
Week 2	Lab 2: Sampling Theory and Aliasing
Week 3	Lab 3: Pulse Code Modulation
Week 4	Lab 4: DELTA MODUALATION
Week 5	Lab 5: Amplitude Shift Keying Generation
Week 6	Lab 6: Phase Shift Keying Generation
Week 7	Lab 7: frequency Shift Keying Generation

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	F.G. Stremler, Introduction to Communication Systems, 2nded, 1982 A. B. Carlson, Communication Systems, McGraw Hill, 4thed, 2002	Yes
Recommended Texts	S.S. Haykin, Communication Systems, Wiley, 2001.B Behrouz A. Forouzan, Data communications and networking, 4thed, 2007	No
Websites	https://www.coursera.org/learn/ analog communication fundamentals	

Grading Scheme

مخطط الدرجات

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

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

Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Data structures and algorithms**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE22306				
ECTS Credits	4				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	Asst.lect Haneen Gumhoor		**e-mail**	haneen.g.sabbar@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**Object oriented programming**	**Semester**	Three
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. An overview of programming concepts and discrete mathematics. 2. Teaching the student how to represent data in computer memory. 3. Teaching the student linear and non-linear data structures and their types and programming addition, deletion, and search algorithms. 4. Efficiently perform operations on lists, stack and queues. 5. Understand the non-linear data structures represented by trees, their synthesis and programming. 6. Ability to distribute data by Hashing table and Priority Queues (Heaps). 7. Teaching the student the various methods and techniques of searching and arranging data in each of the data structures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the principle of recursion function in solving problems. 2. Enable the student to acquire overwrite skills. 3. Problem analysis and solution using data structures and Understand the role data structures play in storing information. 4. How to efficiently perform operations on Linked Lists, Linked Stacks, and Linked Queues. 5. Enabling the student to understand three types of tree traversal techniques. 6. How to estimate the time required for a program. 7. How to reduce the running time of a program from days or years to fractions of a second. 8. How to choose one operation to be more efficient if another less efficient. 9. Analyze a problem and determine what problem elements to represent by data structures and algorithms. 10. Apply data structures and algorithms fundamental techniques to develop small scale applications. 11. Trace, analyze, validate and deduce the output of given program code of different complexities.

Indicative Contents المحتويات الإرشادية	1. Giving theoretical lectures. 2. Attendance education in laboratory lessons and implementation of the prescribed programs. 3. Using illustrations through the lectures. 4. Direct discussion by asking questions and opening the door for dialogue and interaction with students. 5. Participation during the electronic lecture and answer the questions. 6. Application of software on the computer for the practical laboratory. 7. Analysis of a computer program to solve real-world problems based on data structures and algorithms principles. 8. Develop and enhance the student's thinking skill and move him to a a. higher level of thinking. 9. Creating confidence in the student to design and implement data structures and algorithms to solve practical applied problems. 10. Raise the spirit of cooperation and work within a team. 11. Bring out creative ideas among students by raising the spirit of competition. 12. Group thinking skill strategy. 13. Critical thinking strategy in learning. 14. Brainstorming. 15. Application software. 16. Student feedback.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	6. Work effectively as an individual and as a member of a team 7. Demonstrate efficient IT capabilities 8. Developing capabilities and skills to gain the required level of experience and knowledge for the purposes of employment and personal development. 9. Enable the student to link the course outcomes with practical life. 10. Organized and effective planning for program design.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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 and 10	LO #2, #3 and #5, #7
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5 and #11
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #2 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Data structures and Algorithms, Abstract Data Type, Linear and non-Linear data structures

Week 2	A General Overview on recursion function and algorithm analysis
Week 3	Linked Lists, three type of Insertion and Deletion on Linked Lists, Double Linked List
Week 4	The Stack, The functions associated with stack, Linked Stack, Applications of Stack: Expressions Calculator (Infix, Prefix, and Postfix notation)
Week 5	The Queue and Linked Queue
Week 6	The Tree, Binary Tree
Week 7	Tree Traversals: In order, Preorder, and Post order Traversal
Week 8	Mid-course Exam
Week 9	The Search Tree ADT–Binary Search Trees, AVL Trees, Splay Trees, B-Trees, Sets and Maps in the Standard Library
Week 10	Hashing: General Idea, Hash Function, Separate Chaining
Week 11	Priority Queues (Heaps), Model, Simple Implementations, Binary Heap
Week 12	Applications of Priority Queues, d-Heaps, Leftist Heaps, Skew Heaps, Binomial Queues, Priority Queues in the Standard Library
Week 13	Sorting: Preliminaries, Insertion Sort, Shellsort, Heapsort, Mergesort
Week 14	Quick sort, Bucket Sort, External Sorting
Week 15	Algorithm Design Techniques: Greedy Algorithms, Divide and Conquer, Dynamic Programming, Randomized Algorithms, Backtracking Algorithms
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: A General Overview
Week 2	Lab 2: Linked Lists
Week 3	Lab 3: Stacks, Linked Stack
Week 4	Lab 4: Queue, Linked Queue

Week 5	Lab 5: Sets and Maps
Week 6	Lab 6: Hashing, Priority Queues (Heaps)
Week 7	Lab 7: Sorting

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Data Structures and Algorithm Analysis in C++ (Fourth Edition), by M. A. Weiss. Addison-Wesley, ISBN-10: 032144146X & ISBN-13: 9780321441461	No
Recommended Texts	C++ How to Program (5th Edition), by (Harvey & Paul) Deitel & Associates. Prentice Hall, ISBN-10: 0131857576 & ISBN-13: 9780131857575	No
Websites	https://www.w3schools.in/data-structures-tutorial/intro/ https://www.geeksforgeeks.org/data-structures/	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
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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	COE22305				
ECTS Credits	4				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Computer Engineering	**College**	Collage of engineering	
Module Leader	Asst.Lect Hawraa Ahmed		**e-mail**	hawraa.a.jasiem@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	2026/2/1		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. provide an understanding of the fundamental concepts, principles, and functions of operating systems. 2. To explore the various components and mechanisms involved in managing computer hardware and software resources. 3. To develop knowledge and skills related to process management, memory management, file systems, and other key aspects of operating systems. 4. To foster critical thinking and problem-solving abilities in the context of operating system design and implementation. 5. To prepare students for advanced studies or professional careers in operating systems, systems programming, or related fields. 6. To explore advanced topics such as distributed systems, real-time systems, and virtualization. 7. To develop skills in analyzing and designing complex operating system architectures. 8. To explore emerging trends and technologies in the field of operating systems. 9. To prepare students for advanced research or professional careers in a. operating systems or related areas.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the course, students should be able to: 1. Explain the basic concepts, types, and functions of operating systems. 2. Understand process management, including process creation, scheduling, and synchronization. 3. Analyze and apply memory management techniques, including virtual memory and page replacement algorithms. 4. Describe file system concepts, file organization, and access methods. 5. Understand input/output (I/O) management, including device drivers and I/O operations. 6. Discuss protection and security mechanisms in operating systems. 7. Understand the principles of multi-programming, multi-tasking, and CPU scheduling. 8. Explain the basics of distributed operating systems and networking. 9. Analyze and troubleshoot common issues related to operating systems. 10. Understand and design distributed systems and inter-process communication mechanisms. 11. Analyze and design real-time operating systems for time-critical applications. 12. Understand and apply virtualization technologies and techniques. 13. Explore emerging trends and technologies in the field of operating systems. 14. Conduct research, analyze and critically evaluate operating system research papers.

Indicative Contents المحتويات الإرشادية	The following are indicative topics that may be covered in an operating systems course: 1. Introduction to Operating Systems: • Definition, types, and functions of operating systems. • Historical overview and evolution of operating systems. • Operating system structures and components. 2. Process Management: • Process concepts, process states, and process control block (PCB). • Process creation, scheduling, and context switching. • Interposes communication and synchronization. 3. Memory Management: • Memory hierarchy and memory management techniques. • Address spaces, logical vs. physical memory, and memory allocation. • Paging, segmentation, and virtual memory. 4. File Systems: • File concepts, file organization, and access methods. • Directory structures and file allocation methods. • File system implementation, disk management, and file I/O operations. 5. Input/Output Systems: • I/O devices, device controllers, and device drivers. • I/O operations, buffering, and spooling. • Interrupt handling and I/O scheduling algorithms. 6. CPU Scheduling: • CPU scheduling algorithms and their evaluation. • Process coordination, synchronization, and deadlock prevention. • Multi-programming and multi-tasking concepts. 7. Distributed Operating Systems: • Introduction to distributed systems and networking. • Distributed system architectures and models. • Distributed file systems, distributed process management, and synchronization. • Communication protocols and distributed resource allocation. • Fault tolerance and replication in distributed systems. 8. Real-Time Operating Systems: • Characteristics and requirements of real-time systems. • Real-time scheduling algorithms and analysis. • Resource management and synchronization in real-time systems. • Real-time operating system design considerations. 9. Virtualization: • Virtualization concepts and techniques. • Virtual machine management and resource allocation.

	• Virtualization security and performance considerations. 10. Advanced Memory Management: • Advanced memory management techniques, such as segmentation and paging. • Memory protection and access control mechanisms. • Memory virtualization and memory ballooning. • Memory management in virtualized environments. 11. Advanced Process and Thread Management: • Multi-core and multi-threaded systems. • Thread scheduling algorithms and techniques. • Process migration and load balancing. • Thread synchronization and concurrency control mechanisms. 12. Security in Operating Systems: • Security threats and vulnerabilities in operating systems. • Access control mechanisms, including mandatory and discretionary access control. • Intrusion detection and prevention systems. • Security in virtualized environments. 13. Emerging Trends in Operating Systems: • Cloud computing and operating systems. • Edge computing and Internet of Things (IoT) operating systems. • Containerization and container orchestration systems. • Operating systems for specialized architectures (e.g., GPUs, mobile devices).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Interactive Demonstrations: Conduct interactive demonstrations of operating system functionalities and features. Use visual aids, interactive tools, or live demonstrations to engage students and enhance their understanding of complex concepts. 2. Online Resources and Tutorials: Recommend online resources, tutorials, and interactive platforms that offer supplementary materials and exercises for self-paced learning. This allows students to explore topics at their own pace and reinforce their understanding of operating systems. 3. Formative Assessments and Feedback: Provide regular formative assessments, such as quizzes or short assignments, to gauge students' understanding of operating system concepts. Provide prompt feedback to address misconceptions and guide students towards a deeper understanding of the subject. 4. Group Projects and Collaborative Learning: Assign group projects that require students to work collaboratively to solve operating system-related problems. This encourages teamwork, communication, and the exchange of ideas, and allows students to learn from each other's experiences. 5. Discussions and Debates: Engage students in discussions and debates on operating system-related topics. Encourage critical thinking, analysis of different viewpoints, and the exploration of alternative approaches to operating system design and implementation. 6. Case Studies and Real-World Examples: Use case studies and real-world examples to illustrate the application of operating system concepts. This helps students understand how operating systems are used in practical scenarios and reinforces their understanding of the subject matter. 7. Stay Updated with Technology Advances: Stay informed about the latest advancements in operating systems and related technologies. Incorporate current trends and emerging technologies into the curriculum to ensure students are exposed to relevant and up-to-date knowledge.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	2,6,9 and 11	LO #1, #2 ,#6and #9, #12,#13
	Assignments	2	10% (10)	5,7 and 10	LO #5, #7 and #10, #11
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	9	LO #14and #15
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Operating Systems, Computer-System Organization, Computer-System Architecture, Operating-System types, functions Structure and components

Week 2	Operating-System Operations, Process Management, Memory Management, Storage Management
Week 3	Operating System Structure, Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs
Week 4	Operating System Design and Implementation, Operating System Structure, Operating System Debugging, Operating System Generation, System Boot
Week 5	Process, Process Concept, Process Scheduling , Operations on Processes, Inter-process Communication
Week 6	File concepts, organization, access methods, Directory structures ,file allocation methods ,File system implementation, disk management and file I/O operations..
Week 7	I/O devices, device controllers, , device drivers. I/O operations, buffering, spooling, Interrupt handling and I/O scheduling algorithms
Week 8	**Midterm Exam**
Week 9	Introduction to distributed systems ,Distributed file systems, distributed process management, and synchronization , distributed resource allocation, Fault tolerance and replication
Week 10	Real-time systems Characteristics and requirements, scheduling algorithms and analysis, Resource management and synchronization and system design considerations.
Week 11	Virtualization concepts and techniques , Virtual machine management and resource allocation ,Virtualization security and performance considerations
Week 12	Advanced memory management techniques , Memory protection Memory virtualization
Week 13	Advanced Process and Thread Management: Process migration and load balancing. Thread scheduling, synchronization and control
Week 14	Security in Operating Systems
Week 15	Emerging Trends in Operating Systems:
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• William stallings "operating systems - internals and design principles" 7th edition,2011 • "Modern Operating Systems" by Andrew S. Tanenbaum and Herbert Bos	Yes

Recommended Texts	• "Distributed Systems: Principles and Paradigms" by Andrew S. Tanenbaum and Maarten Van Steen • "Real-Time Systems" by Jane W. S. Liu	No
Websites	https://learn.saylor.org/course/view.php?id=94 https://www.classcentral.com/subject/operating-systems	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (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 Analysis**			**Module Delivery**	
Module Type	**B**			☒**Theory** ☐ **Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE22301				
ECTS Credits	5				
SWL (hr/sem)	**75**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Computer engineering	**College**	College of engineering	
Module Leader	Asst.Lect Hasan Mohammed		**e-mail**	hasan.m.khalil@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**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 Objectives أهداف المادة الدراسية	The objective of this course is to develop an understanding of the basic ideas of mathematics encountered in engineering. Focus will be on the methods for understanding complex numbers and fundamentals of the derivative and integration of inverse trigonometric functions. Students will learn some special integration techniques (Integration by part, partial fraction, and substitution) that are useful for the understanding of different engineering subjects. Another objective is to teach the Engineering student about integration applications such as Area under curve and volume. Finally, the student will learn the concept of polar coordinates and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Understand the fundamentals of complex numbers and their properties. 2. Understand the differentiation and integration of inverse trigonometric functions. 3. Understand the differentiation and integration of hyperbolic trigonometric functions. 4. Express the concepts of methods of integration and their different types which can be used in a wide variety of disciplines in engineering. 5. Identify integration applications such as Area under curve and area between two curves. 6. Apply different integration rules to determine the volume of solid using Disk and Washer methods. 7. Understand polar coordinates and their properties. 8. Apply the concept of polar coordinates to solve integration applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Fundamental Concepts of complex numbers. • Complex numbers properties- power and roots • Inverse Trigonometric function and their differentiation • Inverse Trigonometric function Integration • Hyperbolic Trigonometric functions and their differentiation • Hyperbolic Trigonometric functions integration • Methods of integration – Integration by Part

	• Methods of integration - Partial fraction method • Methods of integration – Integration using substation • Integration applications – Area under curve • Integration applications – Area between two curves • Integration applications – Volume of solid using Disk method • Integration applications – Volume of solid using Washer methods • Polar coordinates and its properties • Area under curve in Polar coordinates • Area between two curves in Polar coordinates • Length of curve in Polar coordinates.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple reports involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**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	15% (15)	5 and 10	LO #2, #3 and #5, #6
	Assignments	2	15% (15)	2 and 12	LO #1 and #5
	Report	1	10% (10)	13	LO # 3, #4, #5, and #6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Ordinary differential equation – first order- variable separable
Week 2	Ordinary differential equation – first order- homogenous
Week 3	Ordinary differential equation – first order- Exact
Week 4	Ordinary differential equation – first order - Linear
Week 5	Ordinary differential equation – second order – undetermined coefficient
Week 6	Ordinary differential equation – second order – variation of parameter
Week 7	Ordinary differential equation – higher order
Week 8	**Mid-term Exam**
Week 9	Laplace transform - properties
Week 10	Inverse Laplace transform
Week 11	Solving Ordinary differential equation using Laplace transform

Week 12	Z - transform
Week 13	Z - transform properties
Week 14	Inverse Z - transform
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017.	Yes
Recommended Texts	Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014.	yes
Websites	https://www.coursera.org/learn/ calculus I	

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	**Electronics II**			**Module Delivery**	
Module Type	core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE22302				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Dr.Dhamyaa Husam		**e-mail**	Dhamyaa.husam@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/2/2026		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electronics I	**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	This course aims to: 1. enable the student to have a solid background in physical structure of BJT 2. enable the student to have a solid background in physical structure of FET transistors 3. enable the student to analyze the circuits of the BJT and FET transistors.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Explains the amplification in amplifier circuits with transistors. - Analyzes and Calculates the hybrid parameters and performs measurements in different amplifier circuits. - Calculates the hybrid parameters of the equivalent circuit of a transistor. - Explains cascade amplifier circuits - Calculates parameters in cascade amplifier circuits. - Understand the Frequency Response
Indicative Contents المحتويات الإرشادية	- Explains the amplification in amplifier circuits with transistors. - Analyzes and performs measurements in different amplifier circuits. - Calculates the hybrid parameters of the equivalent circuit of a transistor. - Explains cascade amplifier circuits - Calculates parameters in cascade amplifier circuits.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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	30% (30)	3,5,12	LO #1,2,3 and 6
	Assignments	2	10% (10)	2,12	LO # 2 and 6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	10	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction : Amplification in the AC Domain
Week 2	BJT Transistor Modeling :The Important Parameters: Zi, Zo, Av, Ai, The re Transistor Model
Week 3	The Hybrid Equivalent Model Graphical Determination of the h- parameters Variations of Transistor Parameters
Week 4	Multistage Amplifier
Week 5	FET Circuit Analysis
Week 6	Introduction :Two-Port Systems , Effect of a Load Impedance (*RL*)
Week 7	Effect of a Source Impedance (*Rs*) Combined Effect of *Rs* and *RL*
Week 8	BJT CE Networks , BJT Emitter-Follower Networks
Week 9	BJT CB Networks
Week 10	**Mid exam**
Week 11	General Frequency Considerations Low- Frequency Analysis—Bode Plot Low-Frequency Response—BJT Amplifier
Week 12	Low-Frequency Response—FET Amplifier
Week 13	Miller Effect Capacitance
Week 14	High-Frequency Response—BJT Amplifier High-Frequency Response—FET Amplifier Multistage Frequency Effects
Week 15	**review**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Ac analysis of common emitter transistor
Week 2	Lab 2: Ac analysis of voltage divider transistor
Week 3	Lab 3: Ac analysis of emitter follower transistor
Week 4	Lab 4: Ac analysis of common base transistor
Week 5	Lab 5: Multistage Amplifier Frequency Response
Week 6	Lab 6: High-Frequency Response of Transistor Amplifier
Week 7	Lab 7 High-Frequency Response of Transistor Amplifier

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.	yes
Recommended Texts	" Electronic Devices", By Floyd. 9th ed.	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

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Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Systems Design II**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE22304				
ECTS Credits	4				
SWL (hr/sem)	**125**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	Asst.Lect Ahmed Emad		**e-mail**	ahmed.e.saleem@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
	1. Understand the basics of Random-Access Memory and how to store binary information in RAM. 2. Understand the Memory Decoding and how to demonstrate the operation of decoding. 3. Understand Error Detection and Correction: An error-correcting

Module Objectives أهداف المادة الدراسية	code generates manifold parity check bits that are stored with the data word in memory. Each check bit is a parity over a group of bits in the data word. 4. Understand the basics of Read-Only Memory permanent in which binary information is stored. 5. Understand the Programmable Logic Array, the PAL device with a fixed OR array and a programmable AND array. 6. Understand the Sequential Programmable Devices 7. Learn Register Transfer Level in HDL which transfers are specified by means of procedural assignment statements within an edge-sensitive cyclic behavior. 8. Learn Algorithmic State Machines (ASMs) where the operations are implemented with digital hardware components such as adders, decoders, multiplexers, counters, and shift registers. 9. Learn Control Logic and Sequential Binary Multiplier. 10. Learn Design with Multiplexers in which the flip-flops that hold the binary state value, the decoder that generates the control outputs, and the gates that determine the next-state and output signals.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of basic of memory storage: Students should gain a solid understanding of memory storage such as RAM, ROM, and other circuits. 2. Analysis of sequential programmable devices: Students should be able to analyze and write the truth tables, the output equations, and final results of sequential programmable devices. 3. Algorithmic State Machines and their behavior: Students should learn about command signals that coordinate and execute the various operations in the data section of the machine in order to accomplish the desired data- processing tasks. 4. Circuit analysis techniques: Students should develop skills in circuit analysis techniques, including using circuit diagrams, identifying circuit elements, and applying systematic problem-solving approaches. They should be able to analyze simple and complex logic circuits to determine output. 5. Laboratory skills: Depending on the course, students may have the opportunity to apply their theoretical knowledge through hands-on laboratory experiments. They should develop skills in using measurement instruments, constructing circuits, and verifying theoretical concepts through practical experiments.

6. **Indicative Contents** المحتويات الإرشادية	Indicative content includes the following. 1. Random-Access Memory: [5Hours] 2. Memory Decoding: [5Hours] 3. Error Detection and Correction: [5Hours] 4. Read-Only Memory: [5Hours] 5. Programmable Logic Array: [5Hours] 6. Programmable Array Logic: [5Hours] 7. Sequential Programmable Devices: [5Hours] 8. Mid-course Exam: [2Hours theoretical exam + 1hour practical exam] 9. Register Transfer Level Notation: [5Hours] 10. Register Transfer Level in HDL: [5Hours] 11. Algorithmic State Machines (ASMs): [5Hours] 12. Design Example (ASMD Chart): [5Hours] 13. Sequential Binary Multiplier: [5Hours] 14. Control Logic: [5Hours] 15. Design with Multiplexers: [5Hours] 16. Review and Assessment: [5Hours]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Random-Access Memory
Week 2	Memory Decoding
Week 3	Error Detection and Correction
Week 4	Read-Only Memory
Week 5	Programmable Logic Array
Week 6	Programmable Array Logic
Week 7	Sequential Programmable Devices
Week 8	Mid-course Exam
Week 9	Register Transfer Level Notation
Week 10	Register Transfer Level in HDL

Week 11	Algorithmic State Machines (ASMs)
Week 12	Design Example (ASMD Chart)
Week 13	Sequential Binary Multiplier
Week 14	Control Logic
Week 15	Design with Multiplexers
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Memory Description in Verilog HDL
Week 2	Lab 2: Hamming code (single error correction)
Week 3	Lab 3: Hamming code (double error correction)
Week 4	Lab 4: HDL description of binary multiplier
Week 5	Lab 5: Behavioral (RTL) description of a parallel multiplier
Week 6	Lab 6: Complex programmable logic device (CPLD)
Week 7	Lab 7: Field-programmable gate array (FPGA)

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Digital Design: with an introduction to Verilog HDL by M. Morris Mano and Mechael D. Ciletti, 5th Edition, Pearson Education, 2013.	Yes
Recommended Texts	Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Prentice Hall, 2015.	Yes
Websites	https://onlinecourses.nptel.ac.in/noc21_ee39/preview	

Grading Scheme

مخطط الدرجات

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

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Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Architecture I**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE31305				
ECTS Credits	5				
SWL (hr/sem)	**125**				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	CE		**College**	E	
Module Leader	Asst.Lect Hawraa Ahmed		**e-mail**	hawraa.a.jasiem@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Register Transfer and Microoperations 2- Basic Computer Organization and Design 3- Microprogrammed Control Introduction 4- Central Processing Unit 5- Pipeline
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- understand Register Transfer 2- understand Computer Instructions 3- understand Address Sequencing 4- understand Instruction Formats 5- understand Pipelining 6- Learn Microprogram 7- Learn Data Transfer and Manipulation
Indicative Contents المحتويات الإرشادية	1- Register Transfer and Microoperations Register Transfer Language Bus and Memory Transfers Arithmetic Microoperations Logic Microoperations Shift Microoperations 2- Basic Computer Organization and Design Instruction Codes Computer Registers Timing and Control Instruction Cycle Memory-Reference Instructions Input-Output and Interrupt Complete Computer Description 3- Microprogrammed Control Introduction Control Memory

	Microprogram Example 4- Central Processing Unit Introduction Central Processing Unit General Register Organization Stack Organization Addressing Modes Data Transfer and Manipulation Reduced Instruction Set Computer 5 Pipeline Parallel Processing Arithmetic Pipeline Instruction Pipeline

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Ability to do arithmetic Logic Shift Unit 2- Ability to Design of Basic Computer 3- Ability to Design of Accumulator Logic 4- Ability to Design of Control Unit 5- Ability to Design Program Control 6- Ability to Design RISC Pipeline

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Register Transfer Language Register Transfer Bus and Memory Transfers Arithmetic Microoperations

Week 2	Logic Microoperations Shift Microoperations Arithmetic Logic Shift Unit
Week 3	Instruction Codes
	Computer Registers Computer Instructions
Week 4	Timing and Control Instruction Cycle Memory-Reference Instructions
Week 5	Input-Output and Interrupt Complete Computer Description
Week 6	Design of Basic Computer Design of Accumulator Logic
Week 7	Control Memory Address Sequencing
Week 8	Mid-course Exam
Week 9	Microprogram Example Design of Control Unit
Week 10	Introduction Central Processing Unit General Register Organization
Week 11	Stack Organization Instruction Formats
Week 12	Addressing Modes Data Transfer and Manipulation
Week 13	Program Control Reduced Instruction Set Computer

Week 14	Parallel Processing
	Pipelining Arithmetic Pipeline
Week 15	**Instruction Pipeline** **RISC Pipeline**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Computer Organization And Architecture, William Stallings 2015	No
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microprocessor I**			**Module Delivery**	
Module Type	core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE31306				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Asst.Lect Hawraa Ahmed		**e-mail**	hawraa.a.jasiem@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/10/2025		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Digital system design II	**Semester**	4
Co-requisites module	none	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims أهداف المادة الدراسية	1- understanding the architecture of the microprocessor 2- understanding the internal architecture of the 8086 microprocessors 3- understanding the addressing modes of 8086 microprocessor 4- understanding the instruction sets of 8086 microprocessor 5- enabling the student to write a code in assembly language
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- the student Understand the architecture of the microprocessor 2- the student Understand the internal architecture of the 8086 microprocessors 3- the student distinguishes the different between the microprocessors 4- the student can explain how the content of some registers calculated 5- the student can explain the addressing modes of 8086 microprocessor 6- the student understands the instruction sets of 8086 microprocessors 7- the student enables to write a code in assembly language
Indicative Contents المحتويات الارشادية	• Explain the general construction of microcomputer system. - Explain that a microcomputer system consists of CPU, RAM and ROM memories, input /output interfaces and peripheral units. And explain how to make receiving and sending of data explain the terms of 'address and data bus's • Examine the units in microcomputer system. - Draw a simple memory schema, explain the planning of memory of microcomputer system. - Examine the construction of CPU, know registers and bus systems. - Show their knowledge and ability of software which will be used for programming of process in assembly or advanced level. • Explain the information of introduction to programming. - Explain the arranging of the typical assembly language programmed and its structure. Explain that this programmer should be written in a general form consists of blocks 'Label Area" Instruction Area" "Explaining Area ". - Apply programming. • Realize the data transfer • Write the program by using the instructions of conditioned branching. - Explain what the LOOP is. Know how to write instructions which have to be repeated in the program, in the loop. - Write and apply programmer consist of arithmetic and logical works and shift work. -

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	5
Total SWL (h/sem) الحمل الدراسي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	30% (30)	3,6,10	LO #1, 2, 4 and 7
	Assignments	2	10% (10)	9,10	LO # 5 and 7

Summative assessment	**Midterm Exam**	2 hr	10% (10)	11	LO # 1-7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to the microprocessor and computer.
Week 2	Main structural component of a computer system
Week 3	Intel 8086 microprocessor - Internal Architecture
Week 4	The 8086 Hardware Specifications. Pin-outs and the pin functions.
Week 5	Internal registers of 8086 microprocessor
Week 6	Addressing Modes. Register, immediate, direct, register indirect, based-plus-index, register relative, and base relative-plus-index addressing. Unsigned and signed numbers
Week 7	Instruction Set and Programming - Data Movement Instructions.
Week 8	Instruction Set and Programming – Arithmetic and Logical Instructions.
Week 9	Instruction Set and Programming – shift and rotate instructions
Week 10	Assembly language examples
Week 11	Mid exam
Week 12	The 8086/8088 microprocessor Architecture and pin configuration Minimum mode: Bus timing. e- Ready and the wait state
Week 13	The 8086/8088 microprocessor Architecture and pin configuration Maximum mode: Bus timing. e- Ready and the wait state
Week 14	Hardware organization of the memory address space
Week 15	i/o interface

Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Lab 1: introduction and data transfer instructions
Week 2	Lab 2: arithmetic instructions
Week 3	Lab 3: logic and control instructions
Week 4	Lab 4: jump instruction
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Barry B. Brey "The Intel Microprocessors 8th Edition"	yes
Recommended Texts	Triebel, Walter A. "The 8088 and 8086 microprocessors: Programming, interfacing, software, hardware, and applications : including the 80286, 80386, 80486, and Pentium processor families". 4th ed. Pearson, 2003.	yes
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Web Development**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE31303				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**UGIII**		**Semester of Delivery**	5	
Administering Department	CE		**College**	E	
Module Leader	Asst.Lect Hawraa Ahmed		**e-mail**	hawraa.a.jasiem@gu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**Object oriented programming**	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives أهداف المادة الدراسية	1. To provide students with a solid understanding of web development principles, technologies, and best practices. 2. To equip students with the necessary skills to design and build dynamic and interactive websites. 3. To introduce students to the tools and frameworks commonly used in web development. 4. To foster problem-solving and critical thinking skills in the context of web development projects. 5. To prepare students for entry-level web development positions or further studies in the field. 6. By the end of the program participants will become an industry-ready a. engineer who can be readily deployed in a project
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamentals of web development, including client-side and server-side technologies. 2. Design and implement websites using Python,HTML, CSS, and JavaScript. 3. Utilize front-end frameworks to create interactive user interfaces and responsive designs. 4. Develop server-side applications using a back-end programming language and database integration. 5. Apply web development best practices, including version control, testing, and security considerations. 6. Deploy web applications to servers or cloud platforms and manage domain names and hosting. 7. Utilize Python frameworks such as Django or Flask to develop full-stack web applications. 8. Work with databases and integrate them into Python web applications. 9. Apply web development best practices, including version control, testing, and security considerations. 10. Deploy Python web applications to servers or cloud platforms and manage hosting. 11. Demonstrate an understanding of web design principles and create visually appealing websites. 12. Collaborate effectively in a web development project, from planning to implementation and presentation.
	Indicative content includes the following. 1. Introduction to web development • Overview of web technologies and their role in modern applications • Client-side vs. server-side development and the interaction between them • Introduction to web development tools and environments

Indicative Contents	2. HTML (Hypertext Markup Language) • Basic HTML syntax and structure • Working with HTML tags, attributes, and semantic elements • Creating forms and implementing input validation • Accessibility considerations in HTML 3. CSS (Cascading Style Sheets) • Introduction to CSS syntax and selectors • Styling HTML elements and controlling layout • Responsive design and media queries • CSS frameworks and pre-processors 4. JavaScript • Introduction to JavaScript syntax, variables, and data types • Control structures (conditionals and loops) • Functions, arrays, and objects • DOM manipulation and event handling 5. Front-end frameworks • Introduction to popular front-end frameworks (e.g., React, Angular, Vue.js) • Building interactive user interfaces with components • Routing and state management in front-end applications 6. Back-end development • Introduction to back-end technologies (e.g., Node.js, Ruby on Rails, Django) • Server-side programming and API development • Handling requests and responses • Database integration and basic CRUD operations 7. Web development best practices • Version control with Git and GitHub • Testing and debugging web applications • Performance optimization and caching techniques • Security considerations (e.g., authentication, input validation) 8. Deployment and hosting • Deploying web applications to servers or cloud platforms • Managing domain names and DNS settings • Continuous integration and deployment (CI/CD) • Exploring different web hosting options 9. Web design principles

	• User experience (UX) design fundamentals • Color theory and typography in web design • Layout and visual hierarchy • Responsive design and mobile-first approach 10. Introduction to web development with Python • Overview of web development technologies and Python's role • Client-side vs. server-side development using Python • Introduction to web development tools and environments 11. Python fundamentals • Python syntax, data types, and control structures • Functions, modules, and packages in Python • File handling and data manipulation using Python 12. Introduction to Python web frameworks • Overview of popular Python web frameworks (e.g., Django, Flask) • Setting up a development environment for Python web development • Creating a basic web application using a Python framework 13. Database integration with Python • Working with databases using Python libraries (e.g., SQLAlchemy) • CRUD operations (Create, Read, Update, Delete) with Python and databases • Database modeling and design principles 14. Advanced topics in Python web development • User authentication and authorization in web applications • Handling forms and input validation • API development and integration

Learning and Teaching Strategies	
Strategies	1. Project-Based Learning: Design projects that simulate real-world scenarios and require students to build complete web applications. This approach allows students to apply their knowledge, problem-solve, and gain practical experience. 2. Hands-On Coding: Emphasize practical coding exercises and activities to help students develop their programming skills. Provide coding challenges, assignments, and coding labs that encourage active coding and problem- solving. 3. Collaborative Learning: Encourage group work and collaboration among

	students. Assign group projects or pair programming exercises where students can learn from each other, share ideas, and work together to complete web development tasks. 4. Online Tutorials and Resources: Incorporate online tutorials, documentation, and resources into the curriculum. Point students to reputable websites, video tutorials, and coding platforms where they can access additional learning materials and practice coding exercises. 5. Code Reviews and Feedback: Conduct code reviews to provide constructive feedback on students' code and project implementations. This helps students improve their coding practices, learn from their mistakes, and understand best practices in web development. 6. Demonstrations and Presentations: Conduct live demonstrations of coding techniques, tools, and frameworks. Show examples and explain the concepts and code implementation. Encourage students to present their projects or solutions to the class, fostering communication and presentation skills. 7. Hands-On Tools and Environments: Use web development tools and integrated development environments (IDEs) that provide a user-friendly interface and facilitate coding and debugging. Introduce students to popular tools and frameworks used in the industry to give them exposure to real- world development environments. 8. Practical Exercises and Mini-Projects: Provide coding exercises and mini- projects that target specific web development skills and concepts. These hands-on activities allow students to reinforce their learning and gain practical experience in different aspects of web development. 9. Peer Learning and Mentoring: Encourage peer learning and mentoring by pairing advanced students with beginners or organizing study groups. This helps create a supportive learning environment where students can learn from each other's experiences and provide guidance to their peers. 10. Continuous Assessment and Feedback: Implement regular assessments throughout the course to evaluate students' understanding and progress. Provide timely feedback on assignments, projects, and assessments to guide students' learning and address any gaps or misconceptions. 11. Stay Updated with Industry Trends: Stay abreast of the latest trends, tools, and technologies in web development. Incorporate current industry practices and emerging technologies into the curriculum to ensure students are equipped with relevant and up-to-date skills.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	3
Total SWL (h/sem) الحمل الدراسي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبو عي النظري

	Material Covered
Week 1	**Introduction to HTML :** Introduction to Internet programming, HTML language, Description and running through IE, How to write codes in HTML?, Headings, titles. The body in HTML language, background colors, pages and breaks
Week 2	**Lists & Tables in HTML language :** Ordered list and unordered list, creating table, table attributes and features
Week 3	**Images** : Images , Combining paragraphs with table and images. **Forms in HTML** I : Command buttons, Textboxes and text areas, Checkboxes and radio buttons, Select lists in Forms, combining Forms with images and tables, Introduction to dynamic programming, client side versus server side
Week 4	Introduction to CSS syntax and selectors & Styling HTML elements and controlling layout
Week 5	Responsive design and media queries & CSS frameworks and pre-processors
Week 6	Client-Side Programming and Server-Side Programming : Client-Side Programming and Server-Side Programming, JavaScript, The Script Tag, Handling older browsers, JavaScript Statements, Script statement execute, JavaScript data types, Variables, Data type conversions, Arithmetic operators, Comparison operators, Control Structures, Loops , Arrays and Functions.
Week 7	Window and Document objects ,the window object, creating window, properties and methods
Week 8	Forms and Form elements, creating a form, form properties Passing form data to functions and Submitting forms
Week 9	**Midterm Exam**
Week 10	Front-end frameworks : Building interactive user interfaces with components Back-end development: Server-side programming and API development
Week 11	Introduction to web development with Python, Client-side vs. server-side development using Python Python fundamentals: syntax, data types, control structures Functions, modules, and packages
Week 12	Introduction to Python web frameworks
Week 13	Database integration with Python

Week 14	Advanced topics in Python web development: Working with databases using Python libraries (e.g., SQL Alchemy) CRUD operations (Create, Read, Update, Delete) with Python and databases Database modeling and
	design principles
Week 15	**Advanced topics in Python web development:** User authentication, Handling forms and input validation, API development and integration
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبو عي

	Material Covered
Week 1	Lab 1: Web page creation using HTML
Week 2	Lab 2: Applying CSS styles to HTML elements, including layout and positioning
Week 3	Lab 3: Writing JavaScript functions to perform simple calculations, events handlers and handling user interactions
Week 4	Lab 4: Creating database models and defining relationships between entities and Performing data validation and handling database errors
Week 5	Lab 5: Introduction to Python web frameworks (e.g., Flask, Django), Flask Web Framework, Connecting Python applications to databases
Week 6	Lab 6: Django Web Framework, Building RESTful APIs using Flask or Django Rest Framework.
Week 7	Lab 7: Front-End Development with JavaScript and Python

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Niederst Robbins	Yes

Recommended Texts	• "Flask Web Development with Python Tutorial" by Miguel Grinberg • "Django for Beginners: Build websites with Python and Django" by William S. Vincent	No
Websites	https://developer.mozilla.org/ https://www.w3schools.com/ https://www.fullstackpython.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	**probability**			**Module Delivery**	
Module Type	B			☐**Theory** ☒**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE31301				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department			**College**	College of engineering	
Module Leader	Asst.Lect Hasan Mohammed		**e-mail**	hasan.m.khalil@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
	1. Understanding Basic Probability Concepts: The primary aim is to

Module Objectives أهداف المادة الدراسية	help students understand the fundamental principles of probability. This includes the interpretation of probability, random variables, probability mass/density functions, cumulative distribution functions, expected values, variance, and other basic concepts. Describing the AutoCAD program and Its icons, knowing what's new in AutoCAD version. 2. Probability Distributions: Engineers should understand various discrete and continuous probability distributions, their properties, and how they can be used to model various phenomena. Examples include Binomial, Poisson, Uniform, Normal, Exponential, and Gamma distributions. Reading plans of projects . 3. Modeling Uncertainty: One of the primary uses of probability in engineering is to model uncertainty. This includes understanding how to model random phenomena, from simple things like coin flips to complex systems with many interacting parts. Auto desk AutoCAD software provide powerful ,integrated 2D modeling, drawing ,and layers tools that enable designers to focus more energy on creative ,rather than technical challenges 4. Stochastic Processes: For time-dependent or sequence-dependent phenomena, understanding stochastic processes such as Markov chains, Poisson processes, and queuing theory can be crucial. 5. Problem-Solving Skills: Lastly, a core aim is to develop problem-solving skills, i.e., the ability to apply theoretical knowledge to practical problems, an a. essential trait for any engineer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand Fundamental Concepts: Students will understand fundamental concepts of probability theory, including events, sample spaces, probability axioms, random variables, and types of probability (e.g., conditional, marginal, joint). 2. Proficiency with Probability Distributions: Students will be able to identify, describe, and use different types of probability distributions (both discrete and continuous) and will know how to apply these to engineering problems. 3. Statistical Analysis: Students will be able to perform basic statistical analyses using probabilistic methods. This includes calculating measures of central tendency (mean, median, mode) and dispersion (variance, standard deviation), as well as understanding more advanced concepts such as covariance and correlation. 4. Application of Probability to Real-World Engineering Problems: Students will be able to apply the principles of probability to analyze real-world engineering problems, assessing risks, reliability, and uncertainties in engineering systems. 5. Understanding Stochastic Processes: Students will have a basic

	understanding of key stochastic processes like Markov chains, Poisson processes, and queuing theory, and will know how to apply these to relevant engineering problems. 6. Critical Thinking and Problem-Solving Skills: Students will enhance their a. ability to think critically and solve complex problems using probabilistic methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to probability and statistics. 2. Basic counting principles: permutation and Combination . 3. Frequency distribution. 4. Measures of Tendency. 5. Measures of dispersion. 6. Elementary probability and Conditional probability . 7. Probability distribution Functions. 8. Expected and variance. 9. Distributions. 10. Joint probability distribution Function. 11. Expected, covariance, correlation.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Emphasize the underlying concepts and principles of probability and statistics rather than focusing solely on calculations and formulas. Help students grasp the fundamental ideas behind probability, statistical inference, and data analysis to build a solid.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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	15% (15)	5 and 10	LO #2, #3 and #5, #6
	Assignments	2	15% (15)	2 and 12	LO #1 and #5
	Report	1	10% (10)	13	LO # 3, #4, #5, and #6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to probability and statistics Sample space Events Experiment Basic counting principles: permutation
Week 2	Combination Mixed between permutation and combination
Week 3	Frequency distribution Frequency table Cumulative frequency Histogram O-gives
Week 4	Measures of Tendency Mean Median
	Mode
Week 5	Measures of dispersion Range Average deviation Variance
Week 6	Measures of dispersion Variance Standard deviation

Week 7	Probability Elementary probability
Week 8	Probability Conditional probability
Week 9	Mid exam
Week 10	Probability distribution Functions Discrete and continuous variables Probability distribution Function
Week 11	Expected and variance
Week 12	Distributions Binomial distribution Normal distribution
Week 13	Joint probability distribution Function Marginal Functions Independent variables
Week 14	Expected, covariance, correlation
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Probability and statistics for engineering and scientists By : Walpole and Myers	
Recommended Texts	1. Probability and statistics for engineers By : Miller and Freund's 2. Applied mathematics journals, Schaum series in Probability and statistics	no
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Software Engineering**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**COE31302**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	Asst.Lect Ahmed Emad		**e-mail**	ahmed.e.saleem@gu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. Software Development Life Cycle (SDLC): Understand the various phases of the software development process, including requirements gathering, system design, implementation, testing, deployment, and maintenance. 2. Software Requirements Engineering: Learn techniques for eliciting, analyzing, documenting, and managing software requirements. Explore methods to ensure that requirements are complete, consistent, and feasible. 3. Software Design and Architecture: Study principles and practices of designing software systems and their architectures. Learn about software design patterns, modularization, coupling and cohesion, and trade-offs between different architectural styles. 4. Programming Principles and Practices: Gain proficiency in programming languages, coding standards, and best practices for developing reliable and maintainable software. Learn about code refactoring, code reviews, and code quality assurance techniques. 5. Software Testing and Quality Assurance: Understand testing techniques, strategies, and methodologies to validate software functionality, reliability, and performance. Learn about different types of testing, such as unit testing, integration testing, system testing, and acceptance testing. 6. Software Maintenance and Evolution: Learn strategies for managing software maintenance, bug fixing, and system upgrades. Understand the importance of documentation, version control, and change management in the software maintenance process. 7. Software Project Management: Explore project management methodologies and techniques specific to software development projects. Learn about project planning, scheduling, resource allocation, risk management, and team coordination. 8. Software Configuration Management: Understand the principles and practices of managing software configurations, including version control, release management, and software baselining. Learn about tools and techniques for configuration management. 9. Software Engineering Ethics and Professionalism: Discuss ethical issues and responsibilities in software engineering, including intellectual property, privacy, and software piracy. Understand the importance of professional conduct, legal obligations, and social implications of software development. 10. Software Engineering Tools and Environments: Familiarize yourself with various software engineering tools, such as integrated development environments (IDEs), bug tracking systems, and software modeling tools. Learn how to effectively use these tools to enhance productivity and collaboration.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of Software Engineering Principles: Gain a comprehensive understanding of the fundamental principles and concepts of software engineering, including software development methodologies, best practices, and industry standards. 2. Ability to Apply Software Development Processes: Apply the knowledge of software development life cycles and processes to analyze, design, implement, test, and maintain software systems effectively and efficiently. 3. Proficiency in Requirements Engineering: Acquire skills to elicit, analyze, and document software requirements accurately, ensuring that they meet the needs of stakeholders and are feasible to implement. 4. Competence in Software Design and Architecture: Develop the ability to design software systems and architectures that are modular, scalable, and maintainable. Apply design patterns and principles to create robust and flexible software solutions. 5. Skill in Programming and Coding Practices: Demonstrate proficiency in programming languages and apply coding practices, such as code readability, code reuse, and code optimization, to develop high-quality software. 6. Competency in Software Testing and Quality Assurance: Apply testing techniques and methodologies to validate software functionality, detect defects, and ensure software quality. Develop skills in test planning, test case design, and test execution. 7. Knowledge of Software Maintenance and Evolution: Understand the challenges and strategies involved in maintaining and evolving software systems. Acquire skills in bug fixing, system upgrades, and software documentation to support ongoing software maintenance. 8. Ability to Manage Software Projects: Gain knowledge of project management principles and practices specific to software development projects. Develop skills in project planning, scheduling, resource allocation, risk management, and effective communication. 9. Awareness of Software Ethics and Professionalism: Understand ethical issues related to software development, including intellectual property, privacy, and security. Demonstrate professionalism in software engineering practices, adhering to legal and ethical standards. 10. Familiarity with Software Engineering Tools: Develop an understanding of the software engineering tools and environments commonly used in the industry, including integrated development environments (IDEs), version control systems, bug tracking systems, and software modeling tools. Build the ability to use these tools effectively to support

	efficient and professional software development practices.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Software Engineering: • Definition, scope, and goals of software engineering • Historical development and evolution of software engineering • Software engineering principles, methodologies, and practices 2. Software Development Life Cycle (SDLC): • Overview of the different phases of the SDLC, including requirements engineering, system design, implementation, testing, deployment, and maintenance • Introduction to agile methodologies, such as Scrum or Kanban, and their application in software development 3. Requirements Engineering: • Eliciting, analyzing, and documenting software requirements • Techniques for requirements gathering, including interviews, surveys, and use case analysis • Requirements validation and verification • Managing requirements changes and scope creep 4. Software Design and Architecture: • Principles and concepts of software design and architecture • Structural and behavioral design patterns • Object-oriented design principles • Design documentation and modeling techniques, such as UML (Unified Modeling Language)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Lectures: Traditional lectures are a common strategy for delivering foundational knowledge and introducing key concepts in software engineering. Instructors provide explanations, examples, and demonstrations to convey information to students. 2. Case Studies: Case studies involve analyzing real-world software engineering projects or scenarios. By studying these cases, students gain insights into practical challenges, decision-making processes, and best practices in software engineering. 3. Group Projects: Assigning group projects allows students to collaborate and apply software engineering principles and practices in a hands-on manner. Working in teams, they can develop software systems, following the entire software development life cycle and solving problems collectively. 4. Code Reviews: Conducting code reviews provides students with opportunities to review and provide feedback on each other's code. This strategy promotes critical thinking, encourages collaboration, and helps students improve their coding practices and quality assurance skills. 5. Practical Exercises and Coding Assignments: Providing practical exercises and coding assignments helps students apply their knowledge and skills in practice. These exercises can involve implementing algorithms, designing software modules, or solving software engineering problems. 6. Demonstrations and Simulations: Instructors can use demonstrations or simulations to showcase software engineering concepts or techniques in action. For example, they may demonstrate the use of a version control system or simulate a software testing scenario to illustrate specific principles.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	3

Total SWL (h/sem) الحمل اللدراسي للطالب خلال الفصل	**100**

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Software Development process : • Feasibility and planning • Requirements • Design • Implementation • Acceptance and release Operation and maintenance
Week 2	Software Processes: 1. Sequential The Waterfall Model, 2. Iterative Refinement (Evolutionary Development), 3. Phased Development
Week 3	Requirements Analysis and Specification Requirements in Software Development, Requirements in the Waterfall Model, Requirements in Iterative Refinement, Goals During the Requirements Phase, Why are Requirements Important, The Requirements Process, Requirements Analysis, Requirements Documentation. Requirement specification.
Week 4	Modeling Techniques for Requirements Analysis and Definition UML modling, Data-Flow Models, Entity-Relation Model
Week 5	Software Design Design for Usability, User Interface Design, Information Presentation: Separation of Presentation from Content, The Importance of User Interface Design, Special Considerations: (Disabilities, Computer Systems and Networks, Design Tensions in Networked Systems, Device-Aware User Interfaces, Usability and Cost)
Week 6	System Architecture and Design: System and Subsystem Modeling using UML techniques. Object Oriented Design : complete case study
Week 7	Mid - course Exam

Week 8	Reliability and Dependability User Perception of Reliability, Reliability Metrics, Requirements Specification of System Reliability, Cost of Improved Reliability, Building Dependable Systems: Three Principles, Reliability: Modified Waterfall Model, Key Factors for Reliable Software.
Week 9	Static and Dynamic Verification, Static Verification(Program Inspections, Inspection Checklist: Common Errors), Static Analysis Tools, Failures and Faults, Fault Avoidance, Defensive Programming, Maintenance, Fault Tolerance, Software Engineering for Real Time
Week 10	Validation and Verification, The Testing Process, Test Design, Testing Strategies, Methods of Testing, Stages of Testing, 1. Unit testing (unit test), 2. System testing(integration test, function test, performance test, installation test, Acceptance testing)
Week 11	Performance of Computer Systems Predicting System Performance, Understand Interactions between Hardware and Software, Look for Bottlenecks, Mathematical Models: Queues, Fixing Bad Performance, Techniques for Eliminating Bottlenecks, Measurements on Operational Systems.
Week 12	Software Development Staff, Managing People, Maslow's Hierarchy of Needs, Administrative Leader (Manager), Group Working, Communication, Hiring Criteria, Staff Retention, Salaries, Firmness, Technical Challenges, product manager, quality assurance.
Week 13	Delivering the System Delivery of Software: Categories of Product, Training, Training and Usability, Help Systems, Documentation, Categories of Documentation, Installation Tools,
Week 14	Risk in Software Engineering Failures and Risks, Managing Risk, Canceling a Project, Failure to Cancel a Project, Time to Complete a Software Project, Changing Requirements and Design, Changes of Leadership
Week 15	Software Development process : • Feasibility and planning • Requirements • Design • Implementation Acceptance and release Operation and maintenance
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		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

نموذج وصف المادة الدراسية

Module Title	**Signals and Systems**	**Module Delivery**	
Module Type	**Core**	☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE31304		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	UGII	**Semester of Delivery**	5
Administering Department	Computer engineering	**College**	College of engineering
Module Leader	Asst.lect Haneen Gumhoor	**e-mail**	haneen.g.sabbar@gu.edu.iq
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/10/2025	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Mathematics II	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	The objective of this course is to develop the understanding of the basic ideas of the Signals & Systems encountered in engineering. The focus will be on the methods for characterizing and analyzing continuous-time signals and systems. Students will learn some transform techniques (Fourier transform) that are useful for the understanding of Digital communication systems, Feedback control systems, Satellite and mobile communications, Digital signal processing and Digital image processing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Express the concepts of signals and systems and their different types which can be used in a wide variety of disciplines in engineering. 2. Identify and report system properties such as causality, stability, linearity, and time invariance etc. 3. Apply the convolution integral formulas to determine the output of continuous time systems. 4. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms. 5. Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain. 6. Understand the concept of filters and their design.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Basic signals of continuous time. • Signals and Their Classification - Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals. • Properties of continuous time systems. • Linear, time invariant (LTI) systems. • Operations on Signals • Signal convolution - integral formula • Representation of periodic signals as Fourier series. • Continuous time Fourier transform. • Analysis of LTI systems in the field of time and frequency. • The Fourier Transform - Introduction • Properties of Continuous time Fourier Transform • Finite impulse response (FIR) Filter analysis and design • Infinite impulse response (IIR) Filter analysis and design • Butterworth Analog Filters • Cheby-Chev Analog Filters

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	3
Total SWL (h/sem) الحمل الدراسي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamental Concepts of Signals & Systems - Introduction
Week 2	Signals and Their Classification
Week 3	Operations on Signals
Week 4	Systems and Classification of Systems - Interconnections of Systems
Week 5	Linear Time Invariant Systems - Introduction
Week 6	Properties of Continuous Time LTI System
Week 7	Signal convolution method - integral formula
Week 8	**Mid-term Exam**
Week 9	The Fourier Transform - Introduction
Week 10	Properties of Continuous time Fourier Transform
Week 11	Laplace Transform -Review
Week 12	Filter Analysis and design (FIR & IIR)
Week 13	Butterworth Analog Filters
Week 14	Cheby-Chev Analog Filters
Week 15	Review to Butterworth Analog Filters and Cheby-Chev Analog Filters
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	

Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Alan V. Oppenheim, Signals & Systems 2nd Edition, Pearson Education, 2008.	Yes
Recommended Texts	Signals and Systems, Simon Haykin and Barry Van Veen, 2nd edition, Wiley 2005.	yes
Websites	https://www.coursera.org/learn/ signals and systems fundamentals	

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 Architecture II**	**Module Delivery**
Module Type	**Core**	☐**Theory** ☒**Lecture** ☐**Lab**
Module Code	COE32304	

ECTS Credits	5		☒**Tutorial** ☐**Practical** ☐**Seminar**	
SWL (hr/sem)	**125**			
Module Level	UGIII	**Semester of Delivery**	6	
Administering Department	CE	**College**	E	
Module Leader	Asst.Lect Hawraa Ahmed	**e-mail**	hawraa.a.jasiem@gu.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.	
Module Tutor		**e-mail**		
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date	01/2/2026	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	**Computer Architecture I**	**Semester**	Five
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. Vector Processing 2. Computer Arithmetic 3. Input-Output Organization 4. Memory Organization 5. Multiprocessors
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. understand Vector Processing 2. understand Computer Arithmetic 3. understand Input-Output Organization 4. understand Memory Organization 5. understand Multiprocessors 6. Learn the major type of Computer Arithmetic 7. Learn the difference type of Memory Organization
Indicative Contents المحتويات الإرشادية	1- Vector Processing Vector Processing Array Processors 2- Computer Arithmetic Introduction Addition and Subtraction Multiplication Algorithms Division Algorithms Floating-Point Arithmetic Operations Decimal Arithmetic Unit Decimal Arithmetic Operations 3- Input- Output Organization Peripheral Devices Asynchronous Data Transfer Modes of Transfer Priority Interrupt Direct Memory Access Serial Communication

	4- Memory Organization Memory Hierarchy

	Main Memory Auxiliary Memory Associative Memory Cache Memory Virtual Memory 5 Multiprocessors Characteristics of Multiprocessors Interconnection Structures Interprocessor Arbitration Interprocessor Communication and Synchronization Cache Coherence

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	7- Ability to design Input-Output Interface 8- Ability to read Input-Output Processor 9- Ability to design Memory Management Hardware

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
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	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Vector Processing
Week 2	Array Processors
Week 3	Addition and Subtraction Multiplication Algorithms
Week 4	Division Algorithms
	Floating-Point Arithmetic Operations
Week 5	Decimal Arithmetic Unit Decimal Arithmetic Operations
Week 6	Peripheral Devices Input-Output Interface
Week 7	Asynchronous Data Transfer Modes of Transfer Priority Interrupt
Week 8	Mid-course Exam
Week 9	Direct Memory Access Input-Output Processor Serial Communication
Week 10	Memory Hierarchy Main Memory Auxiliary Memory
Week 11	Associative Memory Cache Memory Virtual Memory

Week 12	Memory Management Hardware
Week 13	Characteristics of Multiprocessors
Week 14	Interconnection Structures Interprocessor Arbitration
Week 15	Interprocessor Communication and Synchronization
	Cache Coherence
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts		No
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

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

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

Module Description Form

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Signal processing**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**COE32303**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Asst.lect Aaid Mohammed		**e-mail**	aaid.m.ameer@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

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

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

Module Objectives أهداف المادة الدراسية	The objective of this course is to develop an understanding of the basic ideas of the Digital Signal encountered in engineering. Focus will be on the methods for characterizing and analyzing Discrete-time signals and systems. Students will learn some transform techniques (Fourier transform, z-transform) that are useful for the understanding of Digital communication systems, Feedback control systems, Satellite and mobile communications, and Digital image processing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Understand the fundamentals of signal sampling. 2. Express the concepts of Discrete signals and systems and their different types which can be used in a wide variety of disciplines in engineering. 3. Identify and report system properties such as causality, stability, linearity, and time invariance etc. 4. Apply the convolution sum formulas to determine the output of discrete time systems. 5. Understand and resolve the Discrete time signals in frequency domain using Fourier series and Fourier transforms, and Fast Fourier Transform. 6. Understand the concept of z-transform and its and develop the ability to analyze the system in z- domain. 7. Understand the concept of digital filter design and develop the ability to design filters using different methods.
Indicative Contents	Indicative content includes the following: • Sampling of continuous-time signals. • Basic signals of Discrete time. • Discrete time Signals and Their Classification - Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals. • Operations on Discrete time Signals • Properties of Discrete time systems. • Discrete time System Impulse response Evaluation. • Signal convolution methods (Graphical method, Table method, mathematical method). • Representation of Discrete Fourier transform and its properties. • Discrete Fourier series (DFS) • Fast Fourier Transform (FFT) • Introduction to Z-transform and its properties. • Digital FIR Filter Analysis and design • Digital IIR Filter Analysis and design - Butterworth Analog Filters • Digital IIR Filter Analysis and design - Cheby-Chev Analog Filters

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	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	20% (20)	5 and 10	LO #1, #2 and #5, #6
	Assignments	2	20% (20)	2 and 12	LO #2, #3 and #6, #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamental Concepts of Discrete Signals and Systems - Introduction
Week 2	Sampling of continuous-time signals: the sampling theorem, Aliasing, Nyquist rate.
Week 3	Discrete time signal types and operations on Discrete time signals.
Week 4	Discrete time system types and properties.
Week 5	Discrete time System Impulse response Evaluation
Week 6	Discrete time System convolution (Graphical method, Table method, mathematical method)
Week 7	**Mid-term Exam**
Week 8	Introduction to Discrete Fourier transform and its properties
Week 9	Discrete Fourier series (DFS)
Week 10	Fast Fourier Transform (FFT)
Week 11	Introduction to Z-transform and its properties.
Week 12	Digital FIR Filter Analysis
Week 13	Digital FIR Filter design
Week 14	Digital IIR Filter Analysis
Week 15	Digital IIR Filter design
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall John G. Proakis, Dimitris K Manolakis., 1992.	Yes
Recommended Texts	Discrete-Time Signal Processing by A. V. Oppenheim and R. W. Schafer, 1999.	yes
Websites	https://www.coursera.org/learn/ Digital signal processing	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	أمتياز	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

Module Information معلومات المادة الدراسية					
Module Title	**Microprocessor Applications 2**			**Module Delivery**	
Module Type	core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE32305				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Asst.Lect Hawraa Ahmed		**e-mail**	hawraa.a.jasiem@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/2/2026		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Microprocessor I	**Semester**	Five
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- enabling the student to write a code in assembly language for interfacing 2- Enabling the student to connect and control the LED 3- Enabling the student to connect and control the 7-segment 4- Enabling the student to connect and control the stepper motor
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- enabling the student to write a code in assembly language for interfacing 2- Enabling the student to connect and control the LED 3- Enabling the student to connect and control the 7-segment 4- Enabling the student to connect and control the stepper motor 5- Enabling the student to connect and rotate the stepper motor 6- Using Switches As Input To Control Mechanical Press 7- Generating Sine Wave Using DAC
Indicative Contents	
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	30% (30)	2,4,14	LO #1, 2, 3,5 and 6
	Assignments	2	10% (10)	3,14	LO # 3 and 7
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-5
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Representing Binary Code With LED Array
Week 2	Representing BCD Code With LED Array

Week 3	Seven Segment Interfacing
Week 4	Square Traffic Light
Week 5	Light Detected Resistor (LDR).
Week 6	IC Tester
Week 7	Stepper Motor
Week 8	Mid-course Exam
Week 9	Rotate The Stepper Motor Bidirectional
Week 10	Reading Switches Status And Output To Leds.
Week 11	Using Switches As Input To Control Mechanical Press
Week 12	Converting Analogue Input (Variable Pot) To Digital
Week 13	Generating Sine Wave Using DAC
Week 14	Motor Control
Week 15	Temperature Control
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Barry B. Brey "The Intel Microprocessors 8th Edition"	yes
Recommended Texts	Triebel, Walter A. "The 8088 and 8086 microprocessors: Programming, interfacing, software, hardware, and applications : including the 80286, 80386, 80486, and Pentium processor families". 4th ed. Pearson, 2003.	yes
Websites		

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

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	COE32306				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	CE		**College**	E	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Dr. Dhamyaa husam		**Module Leader's Qualification**		
Module Tutor			**e-mail**	Dhamyaa.husam@gu.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
	As a result of successfully completing this course, students will:

Module Objectives أهداف المادة الدراسية	1. Understanding Network Fundamentals: Students should develop a solid understanding of the fundamental concepts and principles of computer networks, including network architecture, protocols, models (such as the OSI model), and network components. 2. Network Design and Implementation: Students should learn how to design and implement computer networks, including planning network topologies, addressing schemes, subnetting, and selecting appropriate networking hardware and software components. 3. Network Protocols and Technologies: Students should gain knowledge about various network protocols and technologies used in modern networks, such as TCP/IP, Ethernet, Wi-Fi, routing protocols (e.g., OSPF, BGP), and network security protocols (e.g., SSL/TLS, IPsec). 4. Network Troubleshooting and Maintenance: Students should learn how to diagnose and troubleshoot network issues, including identifying and resolving common network problems, performance optimization, and network monitoring techniques. 5. Network Security: Students should understand the principles of network security, including authentication, encryption, firewalls, intrusion detection systems (IDS), and network security best practices. 6. Network Management: Students should acquire knowledge of network management concepts, tools, and techniques, including network monitoring, configuration management, performance management, and network documentation. 7. Network Services and Applications: Students should be familiar with various network services and applications, such as DNS, DHCP, email, web servers, file sharing, and virtual private networks (VPNs). These learning objectives provide a foundation for understanding computer networks and preparing students for careers in network administration, network engineering, cybersecurity, and related fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamental concepts and principles of computer networks, including network architecture, protocols, and standards . 2. Demonstrate knowledge of the various network components, such as routers, switches, hubs, and network cables, and their functions within a network infrastructure. 3. Design and configure local area networks (LANs) and wide area networks (WANs) using appropriate network topologies, protocols, and addressing schemes. 4. Evaluate different network protocols, such as TCP/IP, Ethernet, and a. wireless protocols, and understand their advantages, disadvantages, and appropriate use cases. 5. Understand the principles of network security, including authentication, encryption, firewalls, and intrusion detection systems, and apply them to secure network infrastructure. 6. Demonstrate knowledge of network management techniques, including network monitoring, performance optimization, and capacity planning. 7. Understand the concepts of network administration and configuration management, including user management, resource sharing, and network documentation.
	Indicative content includes the following. 1. Introduction to Computer Networks • Basic concepts and terminology • Network architecture and protocols • Network standards and organizations (e.g., IEEE, IETF)

Indicative Contents المحتويات الإرشادية	2. Network Models and Protocols • OSI (Open Systems Interconnection) model • TCP/IP (Transmission Control Protocol/Internet Protocol) suite • Ethernet and LAN protocols • Wireless networking protocols (e.g., Wi-Fi, Bluetooth) 3. Network Components and Devices • Network interface cards (NICs) • Routers, switches, and hubs • Network cables (e.g., Ethernet, fiber optic) • Wireless access points 4. Network Topologies and Architectures • Bus, star, ring, and mesh topologies • Client-server and peer-to-peer architectures • Hybrid and cloud-based network architectures 5. Network Addressing and Subnetting • IP addressing (IPv4 and IPv6) • Subnet masks and subnetting techniques • Address resolution protocols (ARP) 6. Network Routing and Switching • Routing algorithms and protocols (e.g., RIP, OSPF, BGP) • Switching techniques (e.g., VLAN, STP, VTP) 7. Network Security and Authentication • Network vulnerabilities and threats • Firewalls and intrusion detection systems • Virtual private networks (VPNs) • Authentication protocols (e.g., RADIUS, TACACS+) 8. Network Performance and Optimization • Network bandwidth and throughput • Quality of Service (QoS) techniques 9. Network optimization and traffic management • Network Management and Monitoring • Network monitoring tools and techniques • Network management protocols (e.g., SNMP) • Configuration management and backups.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Lectures and Presentations: Instructors deliver lectures and presentations to introduce theoretical concepts, explain network protocols, and provide an overview of network architectures. This strategy helps students gain a foundational understanding of computer networks. 2. Hands-on Labs and Simulations: Practical implementation is crucial in computer network subjects. Students participate in hands-on labs where they configure network devices, simulate network scenarios, and troubleshoot network issues. This strategy allows students to apply theoretical knowledge in a practical setting. 3. Group Discussions and Collaborative Learning: Group discussions and collaborative learning activities encourage students to actively engage with the subject matter. They can discuss network design challenges, analyze case studies, and share their insights and experiences. This strategy promotes critical thinking, problem-solving skills, and peer learning. 4. Assignments and Projects: Assignments and projects provide opportunities for students to apply their knowledge to real-world scenarios. They may involve designing network topologies, implementing network security measures, or troubleshooting network problems. This strategy allows students to deepen their understanding and develop practical skills. 5. Online Resources and Self-Study Materials: Instructors provide students with online resources, such as websites, tutorials, and videos, to supplement their learning. Self-study materials, such as textbooks and reference guides, are also recommended. This strategy enables students to explore topics in more depth and at their own pace. 6. Networking Tools and Simulators: Using networking tools and simulators, such as Packet Tracer or GNS3, allows students to practice network configurations and experiment with different network setups. This strategy enhances hands-on learning and provides a safe environment for experimentation. 7. Guest Lectures and Industry Professionals: Inviting guest speakers, such as network engineers or industry professionals, to share their expertise and experiences can provide valuable insights into real-world applications of computer networks. Students can learn about current industry trends, network management practices, and potential career paths. 8. Assessments and Examinations: Regular assessments, such as quizzes, tests, or exams, evaluate students' comprehension of the subject matter. These assessments can be a mix of theoretical questions and practical exercises, allowing students to demonstrate their knowledge and skills. 9. Real-World Examples and Case Studies: Incorporating real-world examples and case studies helps students connect theoretical concepts to practical situations. They can analyze network implementations in various industries, study network failures and their solutions, and understand the impact of network design choices.

	10. Continuous Learning and Professional Development: Encouraging students to engage in continuous learning and professional development is important in a rapidly evolving field like computer networking. Instructors can recommend industry publications, online forums, and networking certifications to students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	3
Total SWL (h/sem) الحمل الدراسي 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 and 10	LO #2, #3 and #5, #7
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #2 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**INTRODUCTION:** Historical review
Week 2	Network Architecture, OSI Vs TCP.
Week 3	Network hardware architecture: topologies, devices.

Week 4	Introduction to types of networks - Optical Networks, Sensor networks.
Week 5	**PHYSICAL AND DATA LINK LAYERS:** Basics for Data communications, Transmission Media
Week 6	Guided and unguided, transmission media - Communication satellites -
Week 7	Data link Layer design issues - Error Detection & Correction - Elementary Data link Protocols - Sliding window Protocols.
Week 8	Mid-course Exam
Week 9	**MAC & NETWORK LAYERS:** Media access control and LANs: The channel allocation – Methods and protocols for LANs.
Week 10	IEEE 802 standards and LAN technologies – Ethernet, token ring – hardware addressing - Network layer design issues - Routing Algorithms - Congestion Control Algorithms-Internetworking
Week 11	**TRANSPORT LAYER:** Transport services - Elements of transport Protocols - A simple transport Protocols –UDP –TCP - Performance issues.
Week 12	**APPLICATION LAYER:** DNS - E-mail (SMTP, MIME, POP3, IMAP)
Week 13	WWW-Multimedia - Introduction to Cryptography
Week 14	Symmetric _key Algorithms
Week 15	Public_ key Algorithms—firewalls.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الأسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to Packet Tracer.
Week 2	Lab 2: creating a first network and establishing a Web Server Connection.
Week 3	Lab 3: Constructing the topology, Static routing , Dynamic routing.
Week 4	Lab 4: OSPF Terminology Introduction, Configure.
Week 5	Lab 5: Interface Configurations for Packet Tracer BGP configuration
Week 6	Lab 6: BGP Verification Commands
Week 7	Lab 7: Static NAT Configuration

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Andrew S. Tanenbaum, "*Computer Networks*", Pearson, Fourth Edition, 2010.	No
Recommended Texts	James F. Kurose and Keith W. Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet*", Pearson Education, Fourth Edition 2011.	No
Websites	https://faculty.ksu.edu.sa/sites/default/files/comnet-a_top-down_approach_3rd_edition.pdf	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	أمتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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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	**Database Systems**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE32302				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	CE		**College**	E	
Module Leader	Asst.Lect Lina Thamer		**e-mail**	lina.t.sultan@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Data structures and algorithms	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم	
Module Objectives أهداف المادة الدراسية	1. Explain the technical and practical approaches that database designers and developers use in practice. 2. Develop a database system to solve real-world problems and facilitate human daily activities. 3. Understand the Characteristics of the Database Approach, Entity– Relationship (ER) Model, Data Models, Schemas and Instances. 4. Understand the Relational Data Model and Relational Database Constraints. 5. Basics of Functional Dependencies and Normalization for Relational Databases. 6. Recognize optimal database queries and effective SQL to ensure database systems can be efficiently and effectively operated. 7. Develop search and inquiry-based skills that can be used to learn, connect, and develop database systems. 8. Understand the Storage Organization of Databases, Hashing Techniques, Indexing Structures, and Database Security.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. On the successful completion of the course, students will be able to: 2. Describe the fundamental elements of relational database management systems. 3. Explain the basic concepts of relational data model, entity-relationship model, relational database design. 4. Design entity-relationship models to represent simple database application scenarios. 5. Learn the basics of SQL. 6. Convert the entity-relationship model to relational tables, populate relational database and formulate SQL queries on data. 7. Improve the database design by normalization. 8. Explain the basic database storage structures and hashing techniques 9. Apply indexing methods including B tree. 10. Deal with database security and access control.
Indicative Contents	Indicative content includes the following. 1. Introduction to Databases 2. Database Languages and Architectures 3. Data Modeling Using the Entity–Relationship (ER) Model 4. Refining the ER Design 5. Relational Data Model and Relational Database Constraints 6. SQL: Data Definition and Retrieval Queries 7. SQL Complex Queries 8. SQL Assertions, Triggers, Views, and Schema Modification 9. ER-to-Relational Mapping

	10. Functional Dependencies and Normalization for Relational Databases 11. Storage Organization of Databases and Hashing Techniques 12. Indexing Structures for Files and Physical Database Design 13. Dynamic Multilevel Indexes Using B-Trees and B+-Trees 14. Database Security

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy of this module is to equip students with the principles and skillset necessary to design and develop a database system that fulfills the requirements of business operational needs.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي 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 and 10	LO #1 - #4
	Assignments	2	10% (10)	2 and 12	LO #5
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #2 - #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Databases: Characteristics of the Database Approach, Actors on the Scene (Database Administrators, Database Designers, End Users), Advantages of using the DBMS Approach, Workers behind the Scene (DBMS system designers and implementers, Tool developers, Operators and maintenance personnel)
Week 2	Overview of Database Languages and Architectures: Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, Database System environment, Classification of Database Management Systems
Week 3	Data Modeling Using the Entity–Relationship (ER) Model: High-Level Conceptual Data Models for Database Design, A Sample Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints
Week 4	Weak Entity Types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, UML class diagrams. Example: A UNIVERSITY Database

Week 5	The Relational Data Model and Relational Database Constraints: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas. Update Operations, Transactions, and Dealing with Constraint Violations
Week 6	SQL: Data Definition, Data Types, Constraints, and Basic Retrieval Queries, SELECT-FROM- WHERE, INSERT, DELETE, and UPDATE.
Week 7	Mid-term Exam
Week 8	SQL Complex Queries: NULL and Three-Valued Logic Comparisons, Nested Queries, Tuples, and Set/Multiset Comparisons, Correlated Nested Queries, The EXISTS and UNIQUE Functions in SQL, Explicit Sets and Renaming in SQL, Joined Tables in SQL and Outer Joins, Aggregate Functions in SQL, Grouping: The GROUP BY and HAVING Clauses, WITH and CASE, Recursive Queries in SQL
Week 9	SQL: Specifying Constraints as Assertions and Actions as Triggers, Views, and Schema Modification
Week 10	Relational Database Design by ER-to-Relational Mapping
Week 11	Basics of Functional Dependencies and Normalization for Relational Databases: Functional Dependencies, Normal forms based on Primary Keys, First, Second and Third Normal Forms, Boyce-Codd Normal Form, Multi valued Dependencies and Fourth Normal Form.
Week 12	Disk Storage, Basic File Structures and Hashing: Storage Organization of Databases, Hashing Techniques (Internal Hashing, External Hashing, Dynamic Hashing, Linear Hashing)
Week 13	Indexing Structures for Files and Physical Database Design: Types of Single-Level Ordered Indexes, Multilevel Indexes
Week 14	Dynamic Multilevel Indexes Using B-Trees and B+-Trees
Week 15	Database Security: Types of Security, Control Measures, Database Security and the DBA, Access Control, User Accounts, and Database Audits, Access Control Based on Granting and Revoking Privileges (GRANT OPTION)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Oracle MySQL Server and Workbench Software
Week 2	Lab 2: Basic SQL (CREATE Database, SHOW, DROP, USE, CREATE Table, ALTER)
Week 3	Lab 3: SQL Query (SELECT-FROM-WHERE, ORDER-BY, INSERT, DELETE, UPDATE, TRUNCATE)
Week 4	Lab 4: Advanced Querying (JOIN, INNER JOIN, LEFT JOIN, DISTINCT, GROUP BY)
Week 5	Lab 5: Aggregate functions, HAVING, UNION, EXISTS, NOT EXISTS
Week 6	Lab 6: Managing Users and Privileges (root User, Creating and Using New Users, Grant Tables)
Week 7	Lab 7: Modifying and Dropping Users, Privileges

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 7th edition 2016, Pearson Higher Education. 2. Vinicius M. Grippa & Sergey Kuzmichev, "Learning MySQL", 2nd edition 2021, O'Reilly Media, Inc.	No
Recommended Texts	Abraham Silberschatz, Henry F. Korth, and S. Sudarshan "Database System Concepts", 7th edition 2020, McGraw-Hill Education.	No
Websites	https://www.coursera.org/learn/relational-database#syllabus https://www.w3schools.com/mysql/mysql_sql.asp	

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	B			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE32301				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department			**College**		
Module Leader	Asst.Lect Hasan Mohammed		**e-mail**	hasan.m.khalil@gu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. **Develop computational skills** : Numerical analysis equips engineering students with skills to use and develop numerical methods, algorithms, and computational techniques for solving mathematical problems. This includes solving algebraic and transcendental equations, integration, differentiation, and differential equations, which are commonly encountered in engineering. 2. **Understanding error analysis**: Error analysis is crucial in numerical methods. Engineers need to understand the source of errors, how to minimize them, and how to estimate the error in a given solution. Understanding and managing numerical errors can make a significant difference in the reliability and accuracy of engineering designs. 3. **Modeling and Simulation**: Numerical analysis aids in the development and improvement of mathematical models and simulations. This is critical in engineering as it allows for the prediction of system behavior before implementation, thus saving resources and increasing efficiency. 4. **Interpolation and Approximation**: Engineers often need to work with discrete data points and infer a continuous function. Numerical analysis aims to provide an understanding of various techniques for interpolation and approximation of functions. 5. **Solving complex systems of equations**: Engineers frequently encounter large, complex systems of equations, especially in fields like structural or electrical engineering. Numerical analysis provides efficient methods to solve such systems, which would be difficult or impossible to solve analytically. 6. **Optimization**: Many engineering problems involve finding an optimum solution, such as minimizing costs or maximizing efficiency. Numerical analysis provides the theoretical background for optimization algorithms. 7. **Application of software tools**: Using software tools for numerical computation (like MATLAB, Python, etc.) is integral in modern engineering. One of the aims of teaching numerical analysis is to develop skills in using these tools effectively. 8. **Understanding limitations of numerical methods**: Not every problem can be solved with every method, and every method has its limitations. Numerical analysis aims to help understand when to apply which method and what to expect from it. Overall, numerical analysis in engineering aims to give students and professionals the tools and knowledge they need to apply mathematical principles effectively in their work, to develop and use numerical methods, and to interpret the results correctly and meaningfully.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. **Understand the principles of Numerical Analysis** : Students should be able to explain the fundamental concepts of numerical analysis and how they apply to various engineering problems. 2. **Apply numerical methods**: Students should be able to apply appropriate numerical methods to solve algebraic and transcendental equations, integration, differentiation, and differential equations. 3. **Error Analysis**: Students should be able to analyze and quantify the errors that arise in numerical computations and understand how to minimize them. 4. **Use Computational Tools**: Students should be able to use software tools like MATLAB, Python, etc., for numerical computations effectively and efficiently. 5. **Implement Numerical Algorithms**: Students should be capable of implementing various numerical algorithms and methods, such as those for interpolation, approximation, solving systems of equations, and optimization. 6. **Interpret and Evaluate Results**: Students should be able to interpret the results of numerical computations in the context of the original engineering problem. They should also be able to evaluate the accuracy and reliability of these results. 7. **Model Real-world Engineering Problems**: Students should be able to develop and refine mathematical models of real-world engineering problems and simulate their behavior using numerical methods. 8. **Design and Conduct Experiments**: Students should be capable of designing experiments that use numerical methods, conduct these experiments, and analyze the resulting data. 9. **Work Collaboratively**: If applicable, students should be able to work effectively as part of a team to solve complex problems using numerical methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Introduction to Numerical analysis Basic principles in numerical analysis Types and most common errors 2- Roots finding solutions Bisection method Newton – Raphson method Secant method Fixed point method

	3- <u>Curve fitting</u> • Least square regression line

	• Interpolation Newton (Forwards , Backwards , divided differences) Lagrange polynomial Hermit interpolation Spline interpolation 8. Numerical Differentiation 9. Numerical Integration (Trapezoidal , Simpson 1⁄3 , Simpson 3⁄8) rules 10. Numerical Solutions of ordinary differential equation (Euler and Runge – Kutta) methods. 7.Numerical Solutions of linear systems (Gauss elimination , Gauss Seidel , Jacobi) .

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Student acquiring a general definition of numerical analysis and how to apply it in other sciences, studying the numerical methods used in the solutions of differential equations and linear and nonlinear systems, being able to deal with functions and their derivatives and integrals in an integrated analytical context, the ability to link vital topics to numerical analysis and find potential solutions for them, real or hypothetical

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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**	12	15% (15)	Continuous	All
	Assignments	12	20% (20)	Continuous	All
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Literature review, errors , Roots finding (Bisection / Newton – Raphson) methods
Week 2	Roots finding (Secant / Fixed point) methods
Week 3	Curve Fitting : Introduction , Least square regression line
Week 4	Least square regression line : the best fit
Week 5	Interpolation : Newton (Forwards , Backwards , divided differences)
Week 6	Interpolation : Lagrange polynomial , Hermit interpolation
Week 7	Interpolation : Spline interpolation
Week 8	Mid exam
Week 9	Numerical Differentiation
Week 10	Numerical Integration : (Trapezoidal , Simpson 1⁄3 , Simpson 3⁄8) rules

Week 11	Numerical Solutions of ODE's : Euler Method , Runge - Kutta Method
Week 12	Numerical Solutions of Linear Systems : Gauss – elimination , Gauss – Seidel
Week 13	Numerical Solutions of Linear Systems : Jacobi method
Week 14	Term exam + tutorial
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1-Advanced engineering mathematics by Erwin Krizge	yes
Recommended Texts	1. Numerical methods by Babu Ram. 2. Applied mathematics journals, schaum series in numerical analysis	no
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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