الملحق رقم (٤)

وصف المواد الدراسية لقسم هندسة الذكاء الاصطناعي والانسان الالي

Module Description Forms for AI & Robotics Engineering

وصف مقررات مواد المرحلة الأولى

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	***Computer and programming***			**Module Delivery**	
Module Type	**C**			☒ **Theory**	
Module Code	**COPR108**			☐ **Lecture**	
ECTS Credits	**7**			☒ **Lab**	
SWL (hr/sem)	**175**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	AI & Robotics Engineering		**College**	College of Engineering	
Module Leader	Marwah Mohammed Mosa		**e-mail**	Marwah.m@aliraqia.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor					
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	This course provides a comprehensive introduction to computer fundamentals, digital hardware concepts, and structured programming using the C language. It is designed to build a solid foundation in computer engineering by combining theoretical understanding of computer organization with practical programming skills. Students will explore how computer hardware and software interact, learn how data is represented and processed within a system, and develop programs that perform efficient computation and control. Emphasis is placed on problem-solving, algorithm design, program logic, and structured programming techniques in C to address real-world engineering problems. The main objectives of this module are to: 1. Provide students with an understanding of computer systems, focusing on hardware components and their functions. 2. Develop a clear understanding of the interaction between hardware and software, emphasizing how C programs operate within computer systems. 3. Provide students with the essential knowledge and skills to design, write, and execute structured programs using the C programming language. 4. Enhance students' logical and analytical thinking for effective problem-solving in computer engineering contexts. 5. Build competency in algorithm development and program structure to produce efficient and reliable software solutions. 6. Foster practical skills in debugging, testing, and documenting C programs for hardware related applications. 7. Enable students to apply programming concepts to design and implement full programs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Describe the fundamental components of a computer system, including input/output devices, memory units, and processing elements, and explain their respective roles in system operation. 2. Differentiate between various types of computer hardware such as RAM, and ROM and identify their specific functions within a computing environment. 3. Demonstrate proficiency in applying programming constructs by writing and executing programs in C . 4. Identify and correctly use variables, constants, data types, and operators to perform computational and logical operations. 5. Utilize input/output operations to interact effectively with users, receive data, and display results. 6. Design and interpret flowcharts using Canva and Lucidchart to represent algorithmic solutions to computational problems. 7. Apply control structures such as conditional statements (if, if–else, switch, elif, else) to manage program logic and flow.

	8. Implement iterative structures (for, while, do–while) to solve repetitive and data-processing problems efficiently. 9. Describe the relationship between hardware and software in computer systems and how programs interact with system resources. 10. Integrate hardware knowledge, programming logic, and AI fundamentals to develop and present hands-on projects that demonstrate problem-solving abilities, creativity, and innovation. 11. Demonstrate logical thinking, systematic problem solving, and computational reasoning. 12. Collaborate in teams to design and implement projects, sharing coding responsibilities and communicating results. 13. Develop independent learning skills to explore new programming languages, tools, and AI concepts beyond the course. 14. Debug and test C programs systematically to ensure correctness, efficiency, and reliability. 15. Develop simple applications that interface with or simulate hardware components, applying low-level programming concepts relevant to computer engineering.
Indicative Contents المحتويات الإرشادية	1. Introduction to Computer Systems: Overview of computer components, including input/output devices, memory units, buses, and the central processing unit (CPU). Understanding computer hardware architecture, and system organization. 2. Introduction to C Programming: Structure of a C program, compiling and executing code, syntax rules, and understanding the C development environment. Writing and running simple C programs. 3. Variables, Constants, Data Types, and Operators: Declaration and initialization of variables and constants. Use of basic data types, arithmetic, relational, logical, and bitwise operators to perform computational tasks. 4. Algorithm Design and Flowcharts: Developing algorithms to solve computational problems. Representing logic through pseudo-code and flowcharts for structured program design. 5. Control Structures and Decision Making: Implementing conditional statements such as if, if–else, and switch for program control and decision-making. 6. Iteration and Looping Constructs: Applying iterative statements like for, while, and do–while loops to execute repetitive tasks efficiently. 7. Program Testing and Debugging: Identifying and correcting logical, syntax, and runtime errors. 8. Introduction to Artificial Intelligence: Overview of AI concepts, dataset preparation, simple model training, evaluation, and performance analysis.Moreover, Independent and Lifelong

	Learning for Developing skills to explore new programming languages, tools, and AI concepts beyond the course through self-directed learning.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In this course, a combination of interactive lectures, hands-on practice, and project-based activities is employed to ensure that students develop both conceptual understanding and practical programming skills. The following strategies are used to support effective learning: 1. Attendance and Participation Attendance in lectures, tutorials, and lab sessions is considered mandatory. Active participation in class discussions, problem-solving exercises, and coding demonstrations ensures that students engage with the material and grasp key programming concepts, computational thinking, and algorithmic problem-solving methods. 2. Assignments and Exercises Regular assignments, coding exercises, and problem sets are designed to reinforce the topics covered in lectures. These tasks provide opportunities for students to apply theoretical knowledge to practical problems, develop debugging skills, and gain experience in C programming environments. Assignments also serve as a feedback mechanism for students to assess their understanding. 3. Laboratory and Practical Sessions Hands-on lab sessions are integral to the course. Students work individually or in small groups to implement algorithms, write and test programs, manipulate data, and visualize results. These sessions bridge the gap between theory and practice, enabling students to develop technical proficiency and confidence in programming. 4. Mini-Projects and Capstone Exercises Small-scale projects and exercises are assigned throughout the course to encourage project-based learning. Students are required to design, implement, and present solutions to real-world problems, integrating programming skills, modular code design, and basic AI concepts. This approach develops teamwork, problem-solving, and communication skills. 5. Examinations and Assessments Midterm and final examinations are used to evaluate students' comprehension of theoretical concepts, algorithmic thinking, and practical programming abilities. Assessments include a combination of written questions, coding tasks, and problem-solving exercises to measure both depth of understanding and applied skills. 6. Peer Learning and Collaboration Students are encouraged to engage in group discussions, code reviews, and peer-learning activities. Collaborative tasks help develop communication, teamwork, and critical thinking skills, while allowing students to learn from different approaches to problem-solving.

	7. Self-Directed Learning and Exploration Students are guided to explore additional programming exercises, library documentation, and AI resources independently. This strategy fosters self-learning, encourages curiosity, and prepares students for continuous skill development beyond the course. 8. Continuous Feedback Instructor feedback on assignments, lab exercises, and projects provides students with constructive guidance to improve their programming, problem-solving, and analytical skills throughout the course.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	96	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	79	**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 #3, #4, #6, #7, #9 and #14,
	Assignments	2	10% (10)	2 and 12	LO #7, #8, #9, #10, #12 and #14.
	Project \lab	1	10% (10)	13	LO #6, #9, #11 and #13.
	Midterm Exam	2hr	10% (10)	7	LO #1-#10

Summative assessment	**Final Exam**	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Course orientation and overview; Introduction to computers and programming concepts
Week 2	Basic Computer Organization; Components of hardware and software interaction
Week 3	Introduction to Algorithms & Problem Solving; Algorithmic logic and computational thinking
Week 4	Algorithms & Flowcharts; Visual representation of problem solutions
Week 5	Introduction to Programming in C: Syntax, Structure, and Tools
Week 6	Variables, Constants, and Data Types; Input/Output in C
Week 7	Introduction to Decision Making: Sequential, Conditional, Iteration
Week 8	Mid-course Exam
Week 9	Control Flow I: Conditional Statements (if, if–else); Decision logic examples
Week 10	Control Flow II: Nested if & Switch Statements; branching logic
Week 11	Iteration I: While & Do-While Loops
Week 12	Iteration II: For Loops & Nested Loops
Week 13	Iteration II: For Loops & Nested Loops

Week 14	Structured Programming Techniques; Debugging and Testing
Week 15	Overview of AI and Robotics, and C Programming
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Lab Orientation and Introduction to C Environment & Computer Hardware
Week 2	Lab 2: Variable declaration & input/output
Week 3	Lab 3: Writing the first C program and Debugging
Week 4	Lab 4: Translating flowcharts into a program
Week 5	Lab 5: Conditional statements practice (if, if-else.end…)
Week 6	Lab 6: Switch-case practice
Week 7	Lab 7: Loop Control Structures (For, while.end)
Week 8	Lab 8: Nested Loops
Week 9	Lab 9: Loop control statements (Break & Continue)
Week 10	Lab 10: Apply previously learned concepts (variables, loops, conditionals, operators, input/output) to a comprehensive mini-project and practice debugging techniques.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Chouhan, S. S. (2023.). Computer Programming: Theory and Practicals. Department of Computer Science and Engineering, Malaviya National Institute of Technology, Jaipur, Rajasthan. 2. Prinz, P., & Kirch-Prinz, U. (2002). A complete guide to programming in C (I. Travis, Trans.). Jones and Bartlett Publishers. ISBN 0-7637-1817-3	Yes

Recommended Texts	1. Deitel, P., & Deitel, H. (2016). *C: How to Program with an Introduction to C (Global Edition, 8th ed.)*. Pearson Education Limited. ISBN 978-1-292-10588-7.	Yes
Website	https://www.canva.com/online-whiteboard/flowcharts/ https://www.onlinegdb.com/online_c_compiler	

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	**Workshop**			**Module Delivery**	
Module Type	**B**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**WORS109**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		AI & Robotics Engineering	**College**	College of Engineering	
Module Leader	Aws Abdulillah Hussein		**e-mail**	aws.a.hussein@aliraqia.edu.iq	
Module Leader's Acad. Title		Assistant Lecture	**Module Leader's Qualification**		master
Module Tutor	Nil		**e-mail**	Nil	
Peer Reviewer Name		Dr. Mazin Nabih Ali	**e-mail**	mazin.n.ali@aliraqia.edu.iq	
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	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	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	٢
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	٥٠		

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 circuit
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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	***Physics***			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	PHYS104			☐ **Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	AI & Robotics Engineering		**College**	College of engineering	
Module Leader	Khalid J. Kazim		**e-mail**	Khalidjkazim@aliraqia.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Khalid J. Kazim		**e-mail**	Khalidjkazim@aliraqia.edu.iq	
Peer Reviewer Name	Omar Hassan Hameed		**e-mail**	Omar.hassan@aliraqia.edu.iq	
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	**Part 1: Statics (Weeks 1-7)** Upon successful completion of the Statics portion, the student will be able to: • Vector Analysis & Measurement: Apply vector methods to represent, add, and resolve forces in 2D, and ensure calculation accuracy using appropriate SI units and dimensional analysis. • Equilibrium of Particles: Accurately construct Free-Body Diagrams (FBDs) for particles and rigid bodies and apply the equations of force equilibrium to solve for unknown forces. • Moments & Couples: Calculate the moment (torque) of a force about a point or axis, determine the effect of force couples, and use Varignon's Theorem to simplify the analysis of complex force systems acting on a body. • Rigid Body Equilibrium: Apply the full set of 2D equilibrium equations to analyze and solve for support reactions for general rigid body systems. • Structural Analysis: Analyze simple trusses and frames using the Method of Joints or the Method of Sections to determine the internal forces acting within structural members. • Friction & Applications: Model and calculate the effects of dry friction to determine required forces for motion or impending motion in mechanical components (e.g., wedges, screws) common in robot mechanisms. • Geometric Properties: Determine the centroid (Center of Gravity) for various composite shapes and calculate the moment of inertia of basic cross-sections, which is foundational for understanding mechanical stability. • _____ **Part 2: Thermodynamics (Weeks 8-14)** Upon successful completion of the Thermodynamics portion, the student will be able

	to: • Thermodynamic Fundamentals: Define and classify thermodynamic systems, properties (intensive/extensive), and states, and distinguish between heat, work, and internal energy. • First Law Application: Apply the First Law of Thermodynamics (Conservation of Energy) to closed systems to analyze the relationship between heat transfer and work during various processes. • Process Analysis: Calculate the work, heat, and internal energy changes for common ideal gas processes (isothermal, adiabatic, isobaric, isochoric) and represent these on relevant property diagrams. • Second Law & Efficiency: Explain the Second Law of Thermodynamics and the concept of entropy, and calculate the thermal efficiency of power cycles, which is critical for evaluating robot power sources. • Pure Substances: Utilize steam and refrigerant property tables (or software) to determine phase and properties (e.g., specific volume, enthalpy, quality) of pure substances during phase-change processes. • Thermal Effects in Systems: Analyze the effects of thermal expansion and basic heat conduction on materials and components, and perform an integrated energy balance on simple robotic sub-systems to assess power consumption and thermal load.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, the students will be able to do the following: **Part 1: Statics & Applied Mechanics (Weeks 1-7)** Upon successful completion of this part, the student will be able to: 16. Analyze Vector Quantities: Resolve forces and position vectors into components and determine the magnitude and direction of the resultant force of a system in 2D space. 17. Apply Equilibrium: Construct accurate Free-Body Diagrams (FBDs) and apply the scalar equations of equilibrium to solve for unknown forces, tensions, or reactions for particles and rigid bodies. 18. Calculate Moments: Calculate the moment (torque) produced by a force about a specified point or axis, and apply Varignon's Theorem to determine equivalent force systems. 19. Solve Rigid Body Systems: Solve for unknown support reactions (pins, rollers, fixed supports) for a 2D rigid body by applying the three conditions for equilibrium. 20. Determine Internal Forces: Analyze simple trusses and frames using the Method of Joints or the Method of Sections to correctly determine the magnitude and nature (tension or compression) of internal forces. 21. Model Friction: Calculate forces necessary to initiate or prevent motion in systems involving dry friction, including applications like wedges and screws. 22. Evaluate Geometric Properties: Locate the centroid (center of gravity) of composite areas and calculate the moment of inertia for basic shapes.

	Part 2: Thermodynamics & Energy Systems (Weeks 8-14) Upon successful completion of this part, the student will be able to: 23. Characterize Systems: Define and classify thermodynamic systems (open/closed) and properties (intensive/extensive), and interpret the relationships between heat, work, and internal energy. 24. Apply the First Law: Calculate the change in internal energy, work, and heat transfer for a process using the First Law of Thermodynamics. 25. Analyze Processes: Sketch and analyze ideal gas processes (isothermal, adiabatic, isobaric, isochoric) on diagrams, and calculate the work and heat transfer associated with each. 26. Apply the Second Law: State the Second Law of Thermodynamics and the concept of entropy, and calculate the thermal efficiency of basic heat engines and power cycles. 27. Utilize Property Data: Use property tables (e.g., steam tables, superheated vapor tables) to determine the thermodynamic state and properties of a pure substance (e.g., quality, specific volume, enthalpy) during phase change. 28. Analyze Material Effects: Calculate thermal expansion in engineering materials and apply the basic principles of conduction as a component of thermal load analysis. 29. Perform System Integration: Perform an integrated energy balance on a mechanical or mechatronic system to quantify energy requirements, losses, and thermal impacts relevant to robot design.
Indicative Contents المحتويات الإرشادية	**Part 1: Statics (Weeks 1-7)** Week 1: Introduction & Measurement: Review of SI units, dimensional analysis, scalar vs. vector quantities, and vector resolution. Week 2: Forces in Equilibrium: Definition of force, the concept of a particle, Newtonian particle equilibrium, and drawing accurate Free-Body Diagrams (FBDs) for concurrent force systems. Week 3: Moments & Couples: Definition and calculation of the moment (torque) of a force, the concept of a couple, and applying Varignon's Theorem to find the moment of a resultant force. Week 4: Equilibrium of Rigid Bodies: The three conditions for 2D rigid body equilibrium, and solving for different types of support reactions (pin, roller, fixed). Week 5: Structural Applications: Analysis of simple trusses using the Method of Joints and the Method of Sections, and introduction to determining internal forces in beams and frames. Week 6: Friction & Applications: Modeling dry friction, coefficients of static and kinetic friction, analysis of impending motion, and friction applications in machine elements like wedges and screws.

	Week 7: Center of Gravity & Moment of Inertia (Basics): Determination of the centroid (Center of Gravity) for composite shapes, and an introduction to the concept and basic calculation of the Moment of Inertia. **Part 2: Thermodynamics (Weeks 8-14)** Week 8: Introduction to Thermodynamics: Defining thermodynamic systems (control mass/volume), states, properties, and an overview of different forms of energy. Week 9: First Law of Thermodynamics: Definition and calculation of boundary work and heat transfer, and application of the First Law for closed systems. Week 10: Thermodynamic Processes: Analysis of common ideal gas processes (isothermal, adiabatic, isobaric, isochoric) and calculation of associated work and heat transfer. Week 11: Second Law of Thermodynamics: Statements of the Second Law, the concept of entropy, and defining thermal and mechanical efficiency in cycles. Week 12: Properties of Pure Substances: Analysis of phase change, interpretation of and diagrams, and using property tables to determine quality, specific volume, and enthalpy. Week 13: Thermodynamics of Materials: Calculation of thermal expansion (linear/volumetric) and basic analysis of heat transfer by conduction for material thermal management. Week 14: Integration & Applications: Comprehensive review of energy balance and applying thermodynamic principles to analyze the energy requirements and thermal impact of typical robotic components and systems. Week 15: Revision & Final Exam: Comprehensive problem-solving and review session.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. In-Class Time (4 Hours/Week)** The main class time will be structured to introduce new concepts, demonstrate problem-solving methodologies, and connect theory to robotics applications. Lecture-Demonstration (Approx. 2.5 hours): Statics: Focus on methodology. Present a step-by-step process for drawing FBDs, applying equilibrium equations, and solving structural problems (trusses, friction). Use examples relevant to robot chassis, linkages, and joints. Thermodynamics: Focus on conceptual clarity and derivation. Explain the physical meaning of energy, entropy, and the Laws. Demonstrate the use of property tables and the process of setting up energy balance equations.

	Active Problem-Solving Sessions (Approx. 1.5 hours): Implement "Think-Pair-Share" activities where students work in pairs to solve a core problem (e.g., finding the support reactions on a robot arm link or calculating the work done in a gas expansion). Use mini-case studies related to robotics: e.g., "Analyze the frictional torque in a servo joint" (Statics) or "Determine the heat rejected by a mobile robot's battery cooling system" (Thermodynamics). Integrate simulations or computational tools briefly to visualize complex concepts (e.g., stress distribution in a truss, or pressure-volume changes in a cycle). **2. Tutorial Sessions (1 Hour/Week)** The dedicated tutorial time will be used for high-value, small-group interaction focused on mastery and individual challenges. Problem Mastery: These sessions are primarily for solving assigned homework problems and addressing common difficulties. The tutor should guide students through the solution process rather than providing final answers. Conceptual Quizzes: Begin each tutorial with a brief (5-10 minute) conceptual quiz focused on the prior week's learning outcomes (e.g., "Draw the FBD for this member," or "State the Second Law"). This ensures students come prepared. Targeted Feedback: Use the hour to provide individualized feedback on specific student errors found in submitted work. For example, if many students struggle with moments, dedicate the tutorial to moment calculations in different coordinate systems. Peer Instruction: Encourage students to explain complex concepts (e.g., Varignon's Theorem, the meaning of entropy) to their peers, solidifying their own understanding.

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**	Around 6	10% (10)	every two weeks	LO #3, #4,#6, #7, #9 and #14,
	Assignments	Around 6	10% (10)	every two weeks	LO #7, #8, #9, #10, #12 and #14.
	Report	1	10% (10)	10	LO #6, #9, #11 and #13.
Summative assessment	**Midterm Exam**	2hr	20% (10)	7	LO #1-#10
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Physics, Units, and Measurements
Week 2	Vectors and Scalars: Components, Addition, and Dot Product
Week 3	Forces and Equilibrium: Newton’s Laws and Free Body Diagrams
Week 4	Moments, Couples, and Center of Gravity
Week 5	Friction and Applications in Static Systems
Week 6	Work, Energy, and Power in Mechanical Systems
Week 7	Introduction to Thermodynamics and Systems
Week 8	Midterm Exam
Week 9	Zeroth Law and Temperature Measurement
Week 10	First Law of Thermodynamics and Energy Transfer
Week 11	Work and Heat in Closed Systems
Week 12	Second Law of Thermodynamics and Heat Engines
Week 13	Entropy and Reversible/Irreversible Processes
Week 14	Review Lecture
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Halliday, Resnick, Walker — Fundamentals of Physics. Engineering Mechanics Statics and Dynamics 14th Edition' by Hibbeler.	No
Recommended Texts	Tipler & Mosca — Physics for Scientists and Engineers	No

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**	
Module Code	**ENGI105**			☐ **Lecture**	
ECTS Credits	**2**			☒ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	UGI	**Semester of Delivery**	1		
Administering Department	AL & Robotics	**College**	College of engineering		
Module Leader	Ahmed Sabah Noori	**e-mail**	ahmedsabahnoori@aliraqia.edu.com		
Module Leader's Acad. Title		**Module Leader's Qualification**			
Module Tutor	Nil	**e-mail**	Nil		
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 provides 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. Drawing Instruments and Techniques Overview of drawing instruments and their uses Sketching techniques and line types Scaling, dimensioning, and labeling 3. Orthographic Projections Principles of orthographic projection Multi view drawings Sectional views and conventions 4. Isometric Projections 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	34	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	16	**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**	12	15% (15)	Continuous	All
	Assignments	12	20% (20)	Continuous	All
	Projects / Lab.	3	5% (5)	12,13,14 and 15	
	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	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	Auxiliary Views
Week 11	Advanced Sections & Developments
Week 12	Assembly Drawings & Fasteners
Week 13	Intro to GD&T
Week 14	Schematics
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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية					
Module Title	**Mathematics I**			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	**MATH106**			☐ **Lecture**	
ECTS Credits	6			☐ **Lab**	
SWL (hr/sem)	150			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UG I		**Semester of Delivery**	1	
Administering Department	AI & Robotics engineering		**College**	College of engineering	
Module Leader	Ahmed L. khalaf		**e-mail**	ahmed.l.khalaf@aliraqia.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ahmed L. khalaf		**e-mail**	ahmed.l.khalaf@aliraqia.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	In this course, for Mathematics I students will learn:

	1. Apply fundamental concepts of linear algebra — including matrices, determinants, inverses, eigenvalues, and eigenvectors — to solve engineering problems. 2. Analyze and evaluate functions of single and multiple variables, including trigonometric, exponential, Hyperbolic trigonometric functions, and logarithmic forms. 3. Understand and apply limits, continuity, differentiation, and integration in the analysis of engineering and AI systems. 4. Understand the concept of vectors 5. Apply the concept of integration to understand integration applications. 6. Utilize derivatives and integrals to model and optimize real-world problems involving motion, control, and system behavior.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Perform matrix operations (addition, subtraction, multiplication, and inversion) and apply them to solve systems of linear equations. 2. Compute determinants, eigenvalues, and eigenvectors, and interpret their significance in engineering and robotic transformations. 3. Evaluate limits and continuity of functions of one and several variables. 4. Differentiate trigonometric, logarithmic, exponential, power, and hyperbolic functions using standard calculus rules. 5. Apply derivatives to engineering problems involving optimization, maxima, and minima. 6. Perform basic and advanced integration techniques and apply them to find areas, volumes, and other physical quantities. 7. Represent and manipulate vectors and their operations in geometric and physical contexts.
Indicative Contents المحتويات الإرشادية	• Matrices: Introduction to matrices and their operations. Determinants of matrices. Inverse matrices. • Systems of Linear Equations: • Eigenvalues and Eigenvectors: Understanding eigenvalues and eigenvectors of matrices. • Functions of multiple variables: trigonometric, exponential, logarithmic. • limit and continuity Introducing the concept of limit and continuity. • Vectors and scalars: addition, subtraction, scalar multiplication. • Differentiation: Differentiation rules and examples. Chain rule and implicit differentiation.

	• Differentiation of trigonometric functions. • Differentiation of logarithmic, exponential, and power functions. • Application of derivatives: maxima, minima, optimization. • Integration: Integration rules and techniques. Definite and indefinite integrals. • Applications of integration – area between curves and volume of revolution. • Hyperbolic functions and their derivatives and integrals.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	To achieve the module outcomes, the following strategies will be used: 1. Lectures and Tutorials – to introduce theoretical concepts and worked examples. 2. Problem-Based Learning (PBL) – to encourage analytical and critical thinking. 3. Group Discussions and Peer Learning – to enhance teamwork and communication skills. 4. Assignments and Quizzes – to assess ongoing understanding and application of key topics. 5. Midterm and Final Exams – to measure cumulative knowledge and problem-solving skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
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	20% (20)	Continuous	All
	Assignments	2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #10, LO #11
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	Matrices: introduction, operation
Week 2	Matrix determination and Matrix inverse
Week 3	Systems of linear equations.
Week 4	Eigenvalues and eigenvectors.
Week 5	Functions of multiple variables: trigonometric, exponential, logarithmic.
Week 6	Limits and continuity.
Week 7	(Mid-term Exam)
Week 8	Differentiation: introduction and basic rules.
Week 9	Chain rule, implicit Differentiation
Week 10	Differentiation of trigonometric functions and Differentiation of logarithmic, exponential, and power functions.
Week 11	Application of derivatives: maxima, minima, optimization.
Week 12	Rules of integration, Definite and indefinite integrals
Week 13	trigonometric logarithmic, exponential, and power functions.
Week 14	Applications of integration – area between curves and volume of revolution.
Week 15	Vectors and scalars: addition, subtraction, scalar multiplication.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas Calculas. George B. Thomas,2018.	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	**Chemistry**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐**Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CHIM107**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		AI & Robotics Engineering	**College**	Collage of Engineering	
Module Leader	Dr. Bilal Ayed Wasmi		**e-mail**	bilal.ayed@aliraqia.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr. Bilal Ayed Wasmi		**e-mail**	bilal.ayed@aliraqia.edu.iq	
Peer Reviewer Name		Dr. Bilal Ayed Wasmi	**e-mail**	bilal.ayed@aliraqia.edu.iq	
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. To provide the students with a foundational understanding of chemistry concepts relevant to engineering and modern technological applications. 2. To illustrate how chemical principles support the development, selection and operation of materials, and smart technologies used in AI, robotics. 3. To develop students' ability to apply chemical understanding to solve practical engineering problems and promote sustainability through green chemistry principles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will learn the following be the end of the course: LO1. Importance of chemistry in engineering applications. LO2. Chemical principles that apply to modern technologies such as AI and robotics. LO3. Periodic trends and element classification, physical and chemical properties of groups. LO4. Classification of different types of chemical reactions, reaction stoichiometric principles. LO5. properties of metals, ceramics, polymer and composite, their structural characteristics and performance. LO6. Smart material types and their properties. LO7. Innovative uses of smart materials in robotics, AI, and advanced systems. LO8. Electrochemical principles and cell operation. LO9. Energy conversion efficiency and sustainability of electrochemical systems LO10. Corrosion mechanisms, different corrosion types and their impacts, and corrosion preventive methods. LO11. Principles of green chemistry, and its metrics. LO12. Application of green chemistry and sustainable chemical solution in industry.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1) Introduction to Engineering Chemistry: (4hrs.) a) Role and importance of chemistry in engineering and technology. 2) Periodic Table and Elemental Properties: (4hrs.) a) Periodic trends and classification of elements. b) Physical and chemical properties of representative element groups. 3) Chemical Reactions and Stoichiometry: (4hrs.) a) Classification of chemical reactions b) Reaction stoichiometry, limiting reagents, and yield calculations. 4) Engineering Materials Chemistry: (8hrs.) a) Definition and properties of metals, ceramics, polymers, and composites. 5) Smart Materials and Advanced Applications: (8hrs.) a) Definition and types of smart materials b) Applications in robotics, sensors, actuators, and AI systems. 6) Electrochemistry and Energy Systems(8hrs.) a) Fundamentals of electrochemical cells and electrode reactions. b) Energy conversion efficiency, battery technology, and fuel cells. 7) Corrosion (8hrs.) a) Definition and Mechanisms of corrosion. b) Types of corrosion and their prevention methods. 8) Green Chemistry and Sustainable Engineering: (8hrs.)

	a) Principles of green chemistry and its metrics. b) Industrial applications of green chemistry in manufacturing and energy production.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Studying engineering chemistry can be challenging yet rewarding. Here are some effective strategies to help you succeed in your engineering chemistry course: 1- Utilize Visual Aids: Use diagrams, charts, and molecular models to visualize complex concepts. This can assist in better understanding structures, reactions, and processes. 2- Practice Problem-Solving: Engineering chemistry involves a lot of problem-solving. Work through problems systematically and practice different types of chemical calculations, such as molarity, concentration, and reaction yield. 3- Study Regularly: Create a study schedule that allows you to review material consistently rather than cramming before exams. This approach aids retention and understanding. 4- Group Study: Study with classmates to discuss concepts and work through problems together. Teaching others can reinforce your own understanding. 5- Utilize Online Resources: Take advantage of online lectures, tutorials, and educational videos. Websites like Khan Academy, Coursera, and YouTube can provide additional explanations and insights. 6- Read the Textbook Thoroughly: Focus on the textbook during your study sessions. Highlight important points, and summarize chapters to reinforce your understanding. 8- Connect Chemistry to Engineering Applications: Understand how chemistry principles apply to engineering problems. This will help you appreciate the material's relevance and motivate your studies. 9-Ask Questions: Don’t hesitate to seek help from professors or peers when you have questions or struggle with a topic. Engaging in class discussions can also clarify concepts. 10- Stay Organized:

	Keep track of assignments, deadlines, and exam dates. An organized approach to your studies will reduce stress and help you manage your time more effectively. 11- Balance Your Studies: Maintain a healthy balance between studying and taking breaks to avoid burnout. Engage in physical activity and maintain a healthy diet to support cognitive function. 12- Seek Feedback: After assignments and exams, review feedback carefully to understand what you did well and where you can improve.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	3, 8, and 11	LO4, LO8, and LO10
	Assignments	2	10% (10)	6, 12	LO6, LO12
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO1-LO7
	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 Engineering Chemistry • Course overview and objectives • Basic concepts of chemistry • Importance of chemistry for engineering applications)Relevance of chemistry in AI hardware and robotics).
Week 2	Periodic table of elements. • Periodic Table Groups Classification/Elements physical and chemical properties • Chemical bonding, molecular structure
Week 3	Chemical Reactions and Reaction Stoichiometry • Types of Chemical Reactions • Reaction Stoichiometry; Limiting Reagents, Theoretical, Actual and Percent Yields
Week 4	Materials Chemistry • Classification of materials • Metals, Ceramics
Week 5	Materials Chemistry • Polymers • Composites
Week 6	Smart materials Application of smart materials.
Week 7	Smart materials Application of smart materials.
Week 8	Equilibrium and Le Chatelier's Principle
Week 9	Electrochemistry Electrochemical Cells
Week 10	Electrochemistry • Battery

	Fuel cells and hydrogen storage
Week 11	Corrosion and its Prevention • Introduction to corrosion Classification of Corrosion
Week 12	Corrosion and its Prevention • Types of Corrosion Damage Corrosion elimination and Control
Week 13	Green Chemistry • Introduction to Green Chemistry Tools and metrics of green chemistry
Week 14	Green Chemistry Applications of Green Chemistry in Industry
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• **General Chemistry: Principles and Modern Applications"** (11th Ed.) – *Petrucci, Herring, Madura, Bissonnette,2012.* • **Chemistry: The Central Science"** (14th Ed.) – *Brown, LeMay, Bursten, Murphy, Woodward, Stoltzfu. 2023*	Yes
Recommended Texts	• **Essentials of General Chemistry** by D.D. Ebbing, S.D. Gammon, and R.O. Ragsdale,2003, Houghton Mifflin Company, New York. • Raymond Chang, **General Chemistry**, McGraw Hill 9th ed., 2007 • **Green Chemistry: An Introductory Text**, By Mike Lancaster, 2020.	No
Websites	https://chem.libretexts.org/ https://openstax.org/details/books/chemistry-2e?Student%20resources https://www.khanacademy.org/science/chemistry/chemical-bonds https://open.umn.edu/opentextbooks/textbooks/22	

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 I			**Module Delivery**	
Module Type	S			☒ **Theory**	
Module Code	ARLA101			☐ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Anwar Qutaiba Yahya		**e-mail**	anwar.q.yahya@aliraqia.edu.iq	
Module Leader's Acad. Title	Lecturer Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	anwar.q.yahya@aliraqia.edu.iq	
Peer Reviewer Name	Ass.lec. Asmaa falih jassm		**e-mail**	asmaafalih2@gmail.com	
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 Aims أهداف المادة الدراسية	١- تعد اللغة العربية وسيلة للتواصل فهي تحمل رسالة بين المتكلمين، ولكي تكون هذه الرسالة واضحة ومفهومة يجب ان يكون ترتيب مفرداتها حسب التركيب القواعدي لتلك اللغة. ومن هنا برزت وبشكل جلي ضرورة تدريس القواعد أو النحو في كل اللغات ٢- تعرف الطالب على مهارات الكتابية والتعبير والوقوف على مواطن الخطأ لتصويب النطق الصحيح ٣- إتقان مهارة الكتابة الصحيحة بمعرفة قواعد الإملاء ولاسيما مواضع الاخطاء الشائعة ٤- الحفاظ على اللغة العربية كونها لغة القرآن الكريم ٥- التعريف بالمبادئ الاساسية للغة العربية من خلال تنمية المهارات الكتابية والتعبير والمحادثة
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	١-اكتساب الطالب معرفة المفاهيم الاساسية للغة العربية وتطبيقها من خلال الأمثلة ٢-معرفة كتابة الكلام الصوتي بشكل مضبوط من حيث الاصوات الصحيحة أو المعتلة ٣-دراسة الطالب موضوع العدد ومعرفة كيفية كتابة بالشكل الصحيح ٤-يمكن الطالب ايجاد الحلول المناسبة الصحيحة للمشاكل الحقيقية المعقدة تنمية الحس الفكري من خلال أعطاء أمثلة للغة العربية وتطبيقها ٥- تكليف الطلبة بكتابة البحوث والتقارير لاختبار مدى استيعابهم للقواعد الأساسية للغة العربية وتطبيقها في حياتهم اليومية
Indicative Contents المحتويات الإرشادية	١- ارشاد الطلبة إلى تكوين خزين معرفي من أنظمة اللغة وأحكامها وقواعدها الاساسية ٢-ارشاد الطلبة إلى اكتساب مهارات اللغة الاساسية والتدرب عليها من خلال التطبيق العملي كتابة ونطقا ٣-ارشاد الطلبة الى الاطلاع على النصوص من الشعر والنثر بمختلف العصور ومحاكاتها في كتابة النصوص التي تعبر عن حياتهم اليومية ومشاعرهم وعواطفهم الذاتية ٤-ارشاد الطلبة إلى ما يؤدي الى تعزيز مهاراتهم والانتقال به الى مستوى التفكير العالي ٥-ارشاد الطلبة من خلال تعبير عن افكارهم من خلال تكوين مجموعات والتنافس بينهم

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	١-أفضل طريقة في تعليم الطلبة النحو العربي لاهميته في تعلم هذه اللغة واهميته في الترجمة، هي اتباع مبدأ التعاون في التعلم. على ان يتعاون الطلاب في تهيأة مادة الدرس وتقديمها بعد تقسيمهم الى مجاميع تهتم كل مجموعة بجانب مادة الدرس. ٢-القاء المحاضرات النظرية بشكل افتراضي مباشرة على السبورة ٣-عمل بحوث وتوزيعها على مجاميع طلابية لمعرفة فهمهم للمادة او ادراكهم لها ٤-ان الطريقة الاستقرائية باستنباط القاعدة من الامثلة تعد ناجحة في تدريس النحو ٥-اهم طرائق التعلم والتعليم هي استراتيجية مهارات التفكير ضمن مجموعة ٦- استراتيجية التفكير الناقد في التعلم، ايضا من اهم طرائقه العصف الذهني

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	34	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	16	**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	الميزان الصرفي والمعلقات
Week 2	الجموع العربية
Week 3	اسناد الفعل للضمائر وسورة البقرة من الآية (٢٦٠-٢٦٣)
Week 4	تصريف الأفعال من حيث: الصحة والاعتلال والتجرد والزيادة
Week 5	المشتقات وحديث إتمام مكارم الأخلاق
Week 6	الحروف الهجائية (الشمسية والقمرية) وعلامات الترقيم

Week 7	احكام كتابة الهمزة (همزة الوصل وهمزة القطع، وهمزة المتوسطة، وهمزة المتطرفة)
Week 8	المدارس المعجمية ومعاني الألفاظ الغريبة في القرآن الكريم كالفظة تفهم وفرشا ونقيرا
Week 9	(Mid-term Exam)
Week 10	منهج مدرستي العين والأساس والتمرين على استخراج الألفاظ وكذلك موضوع الأخطاء اللغوية الشائعة
Week 11	اقسام الكلام وعلامة اعرابها
Week 12	المعرب والمبني والمعرفة والنكرة
Week 13	المبتدأ والخبر والنواسخ
Week 14	مقدمة عامة في البلاغة العربية
Week 15	(Mid-term Exam)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	الوجيز في اللغة العربية، محي هلال سرحان، شرح قطر الندى وبل الصدى، لابن هشام الانصاري، الاجرومية ابي عبدالله محمد الصنهاجي الاملاء والترقيم في الكتابة العربية، عبد العليم ابراهيم، اللغة العربية لغير المختصين، مصطفى جطل وصلاح كزارة	Yes
Recommended Texts	جامع الدروس العربية، مصطفى الغيلاني، معاني النحو، فاضل السامرائي دراسة في قواعد الاملاء د. عبد الجواد الطيب، موسوعة الشامل في الكتابة والاملاء، موسى 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	Human Rights and Democracy			**Module Delivery**	
Module Type	S			☒ **Theory**	
Module Code	HARD103			☐ **Lecture**	
ECTS Credits	2			☐ **Lab**	
SWL (hr/sem)	50			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	2	
Administering Department			**College**	Collage of engineering	
Module Leader	Abdalrahman Mohamed		**e-mail**	Ulrahman217@gmail.com	
Module Leader's Acad. Title	assistant teacher		**Module Leader's Qualification**	MSc	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	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. Familiarize students with human rights and duties towards the individual and society 2. Highlighting the importance of the individual knowing his rights to carry out his duties to the fullest 3. 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. 4. 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	Indicative content includes the following.

المحتويات الإرشادية	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	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	**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	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	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

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	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

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	MATH 122			☐ **Lecture**	
ECTS Credits	**5**			☐ **Lab**	
SWL (hr/sem)	**125**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	AI & Robotics Engineering		**College**	College of engineering	
Module Leader	Ahmed L. Khalaf		**e-mail**	Ahmed.l.khalaf@aliraqia.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ahmed L. Khalaf		**e-mail**	Ahmed.l.khalaf@aliraqia.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	MATH106	**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	By the end of this course, students will be able to: 1. Apply integration techniques to a wide range of functions, including trigonometric, inverse trigonometric, exponential, and logarithmic forms. 2. Utilize advanced methods of integration such as integration by parts, by substitution, partial fraction expansion, and power reduction formulas for trigonometric functions. 3. Analyze and solve engineering problems involving the application of integration to determine areas between curves, volumes of revolution, and other physical quantities. 4. Understand and employ polar coordinates for curve representation, transformation, and application in robotics and control systems. 5. Explore and apply complex numbers — including powers, roots, and exponential forms — to model and solve engineering problems. 6. Understand and manipulate inverse trigonometric functions, their derivatives, and integrals, and relate them to trigonometric functions in engineering analysis.
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 • 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	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	4
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	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	Methods of integration – Integration by Part and integration
Week 6	Methods of integration – Integration using Partial fraction method
Week 7	**Mid-term Exam**
Week 8	Methods of integration – Integration by substitution,
Week 9	Methods of integration –Powers of sine and cosine.
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**

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, 2018.	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	Digital System Design			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	DISD 124				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		AI & Robotics	**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title		Professor Dr.	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**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 Aims أهداف المادة الدراسية	• Introduce students to digital systems, number systems, and logic operations. • Develop ability to analyze and design **combinational and sequential logic circuits.** • Teach **logic simplification** using Boolean algebra and Karnaugh maps. • Enable students to **design, simulate, and test** digital systems using theoretical calculations and software tools. • Implement logic gates, **combinational and sequential logic circuits** using HDL (VHDL/Verilog).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify and convert between different number systems and binary codes. 2. Explain and implement logic gates and Boolean expressions. 3. Simplify logic circuits using Boolean algebra and K-map techniques. 4. Design and analyze combinational logic circuits (adders, multiplexers, decoders, comparators). 5. Understand and design sequential logic circuits using latches and flip-flops. 6. Construct, test, and troubleshoot digital circuits on simulation boards and interpret their real-world behavior through experimental verification.
Indicative Contents المحتويات الإرشادية	1. Introduction to Digital Systems & Number Systems 2. Boolean Algebra and Logic Gates 3. Logic Simplification (K-map, SOP/POS) 4. Combinational Logic Design (adders, decoders, multiplexers) 5. Introduction to Sequential Logic 6. Latches and Flip-Flops 7. Experimental verification 8. Design Procedure and Final Project
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	

Strategies	**Learning and Teaching Strategies:** 1. **Lecture-Based Teaching:** Clear, structured delivery with examples and visual aids**.** 2. **Guided Class Discussions:** Simple questions and real-world scenarios to encourage engagement**.** 3. **Weekly Quizzes and Recap Activities:** Short interactive quizzes to reinforce learning**.** 4. **Group-Based Mini Assignments:** Basic collaborative tasks to apply concepts. 5. **Visual Aids and Demonstrations:** Use of videos, infographics, and simple diagrams to explain key ideas.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	66	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	59	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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
	Quizzes	2	10% (10)	5, 12	LO # 1, 2, 3

Formative assessment	**Assignments**	2	10% (10)	4, 10	LO # 3, 4
	Projects	1	10% (10)	13	LO # 4,5, 6
	Report	1	10% (10)	11	LO # 5, 6
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	8	LO # 1, 2, 3, 4
	Final Exam	3 hr.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to Digital Systems and Number Systems** overview of digital systems, binary representation, number-base conversions, octal and hexadecimal numbers.
Week 2	**Complements and Signed Numbers** 1's and 2's complements, signed binary arithmetic, binary codes (BCD, Gray).
Week 3	**Logic Gates and Binary Logic** basic logic operations, truth tables, AND/OR/NOT/NAND/NOR/XOR/XNOR gates, circuit implementation.
Week 4	**Boolean Algebra and Simplification** basic laws and theorems, DeMorgan's laws, canonical forms, Boolean simplification.
Week 5	**Karnaugh Map Minimization** K-map simplification (2, 3, 4 variables), SOP/POS expressions, don't-care conditions, NAND/NOR implementation.
Week 6	**Combinational Logic Design I** design and analysis of adders, subtractors, decoders, and encoders.
Week 7	**Combinational Logic Design II** multiplexers, demultiplexers, magnitude comparators, and design practice.
Week 8	**Midterm Exam**
Week 9	**Introduction to Sequential Logic** difference between combinational and sequential circuits, concept of memory, clock signals, timing diagrams.
Week 10	**Latches** SR latch, D latch, gated latch, timing characteristics, and circuit implementation.

Week 11	**Flip-Flops** D, JK, T, and SR flip-flops; edge-triggered operation; truth tables; timing and setup/hold analysis.
Week 12	**Design and Analysis of Sequential Circuits** state diagrams, state tables, Mealy and Moore models.
Week 13	**Sequential Circuit Example Designs** simple sequential system examples.
Week 14	**Practical Integration and Troubleshooting** experimental verification, board testing, identifying logic errors, improving design performance.
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	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	***Engineering Mechanics***			**Module Delivery**	
Module Type	**C**			☒ **Theory**	
Module Code	MEEN125			☐ **Lecture**	
ECTS Credits	5			☐ **Lab**	
SWL (hr/sem)	**125**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	AI & Robotics Engineering		**College**	College of engineering	
Module Leader	Khalid J. Kazim		**e-mail**	Khalidjkazim@aliraqia.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Khalid J. Kazim		**e-mail**	Khalidjkazim@aliraqia.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	27/10/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	PHYS104	**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	This module aims to provide Robotics Engineers with a crucial foundation in Dynamics and Fluid Mechanics by enabling students to: analyze and solve problems involving the motion (kinematics) and forces (kinetics) of particles and rigid bodies using Newton's Laws, the Work-Energy Principle, and the Impulse-Momentum Principle; calculate the center of mass and analyze rigid body rotation using moments of inertia; understand the fundamentals of vibration (SHM); and finally, apply the principles of fluid mechanics to analyze fluid properties, fluid statics (pressure, buoyancy), and fluid dynamics (Continuity and Bernoulli equations) to solve for flow conditions in pipes, specifically relating these concepts to hydraulic, pneumatic, and cooling systems used in robotics applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Part 1: Dynamics of Particles and Rigid Bodies (Weeks 1-9)** Upon successful completion of this part, the student will be able to: **Analyze Particle Kinematics**: Describe and analyze the motion of a particle using position, velocity, and acceleration in both rectilinear and curvilinear coordinate systems. **Apply Newton's Laws:** Apply Newton's Second Law in different coordinate systems to solve for the kinetics of particles and determine forces causing observed motion. **Use Work-Energy Principles:** Apply the Work-Energy Principle to relate work done by forces to changes in kinetic and potential energy, and calculate the power developed by a system. **Use Impulse-Momentum Principles:** Apply the Impulse-Momentum Principle to analyze the effects of forces acting over time and use the Conservation of Linear Momentum to solve problems involving collisions. **Analyze Systems of Particles**: Determine the center of mass for a system of particles and apply conservation principles to analyze the motion of the entire system. **Analyze Rigid Body Kinematics:** Describe the kinematic motion of 2D rigid bodies, including rotation about a fixed axis and plane general motion. **Apply Rigid Body Kinetics:** Calculate the mass moment of inertia for simple rigid bodies and apply the equations of motion to solve for the kinetics of rigid bodies. **Analyze Vibration:** Describe and analyze the motion and energy of a system undergoing Simple Harmonic Motion (SHM). **Part 2: Fluid Mechanics and Applications (Weeks 10-14)**

	Upon successful completion of this part, the student will be able to: **Characterize Fluids:** Define and relate fundamental fluid properties (e.g., density, pressure, viscosity) and classify different flow types. **Analyze Fluid Statics:** Apply Pascal's Law and the principles of buoyancy (Archimedes' Principle) to solve hydrostatic problems, and use manometers to measure pressure. **Apply Fluid Dynamics Equations:** Apply the Continuity Equation (conservation of mass) and the Bernoulli Equation (conservation of energy) to solve problems involving incompressible fluid flow in ideal systems. **Evaluate Internal Flow**: Calculate the Reynolds number to distinguish between laminar and turbulent flow and understand the concept of energy losses in internal pipe flow. **Relate to Robotics**: Explain the role of fluid mechanics principles in the design and operation of hydraulic, pneumatic, and cooling systems critical to robotics.
Indicative Contents المحتويات الإرشادية	**Part 1: Dynamics of Particles and Rigid Bodies (Weeks 1-9)** This section focuses on the analysis of motion and the forces that cause it, essential for understanding robot acceleration, control, and mechanism design. • **Week 1: Introduction to Dynamics:** Fundamental concepts (mass, space, time), different types of motion (translational, rotational, general), and an introduction to relevant **coordinate systems** (Cartesian, normal-tangential, polar). • **Week 2: Kinematics of Particles:** Detailed analysis of **rectilinear motion** (constant and variable acceleration), and **curvilinear motion** using vector notation and different coordinate systems. • **Week 3: Kinetics of Particles (Newton's Laws):** Application of to solve for forces and acceleration in particle systems, including gravitational forces and constrained motion. • **Week 4: Work–Energy Principle:** Defining **kinetic and potential energy**, applying the Work-Energy Principle, and calculating **power and efficiency** in dynamic systems. • **Week 5: Impulse–Momentum Principle:** Defining **linear momentum and impulse**, applying the Impulse-Momentum Principle, and analyzing different types of **collisions** (elastic and inelastic). • **Week 6: Systems of Particles:** Locating the **mass center** (center of gravity) of a system, and applying the conservation principles for linear and **angular momentum** to particle systems. • **Week 7: Rigid Body Kinematics:** Distinguishing rigid body motion, analysis of **rotation about a fixed axis**, and **general plane motion** (using instantaneous centers of zero velocity). • **Week 8: Rigid Body Kinetics:** Defining and calculating **mass moments of inertia**, and applying the **equations of motion** for a rigid body. • **Week 9: Vibration Fundamentals:** Introduction to simple harmonic motion (**SHM**), defining natural frequency, period, and amplitude for undamped single degree-of-freedom systems.

	Part 2: Fluid Mechanics and Applications (Weeks 10-14) This section introduces the principles of fluid behavior crucial for understanding hydraulic/pneumatic actuation and thermal cooling systems. • **Week 10: Introduction to Fluids:** Defining **fluid properties** (viscosity, density, specific weight), types of fluids, and the concept of pressure. • **Week 11: Fluid Statics:** Principles of fluid pressure at rest, **Pascal's Law**, measurement using **manometry**, and the application of **buoyancy** (Archimedes' Principle). • **Week 12: Fluid Dynamics:** Derivation and application of the **Continuity Equation** (mass conservation) and the **Bernoulli Equation** (energy conservation) to ideal, incompressible flow. • **Week 13: Internal Flow & Losses:** Introduction to flow regimes: calculating the **Reynolds number**, distinguishing between **laminar and turbulent flow**, and qualitative discussion of major/minor head losses in pipes. • **Week 14: Applications in Robotics:** Case studies focusing on **hydraulic and pneumatic actuation** (cylinder sizing, force output), and the role of fluid dynamics in **robot cooling systems** (pumps, heat sinks). • **Week 15: Review & Final Exam:** Comprehensive problem-solving and review of all module content.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. In-Class Time (4 Hours/Week) The extended in-class time will be used to build analytical rigor and introduce complex fluid concepts. Lecture-Demonstration & Methodology (Approx. 2.5 hours): Dynamics: Focus on systematic problem-solving methodology. Introduce dynamic concepts (kinematics, work-energy, impulse-momentum) by demonstrating the process of selecting the correct coordinate system and applying the relevant governing equation for a given problem. Fluids: Focus on conceptual visualization. Use demonstrations (real or simulated) to illustrate abstract concepts like pressure variation, buoyancy, and the differences between laminar and turbulent flow. Derive and explain the physical meaning of the Continuity and Bernoulli equations.

	Application-Focused Problem Sessions (Approx. 1.5 hours): Implement Structured Group Work where students solve multi-step problems that integrate concepts (e.g., "Analyze the impulse and momentum transfer during a robotic gripper's impact" or "Calculate the velocity of fluid exiting a cooling nozzle"). Use mini-case studies directly related to robotics: e.g., analyzing the dynamics of a robotic arm during a rapid movement, or determining the power requirements for a hydraulic actuator. Encourage the use of computational checks (e.g., brief spreadsheet use) to verify analytical solutions, fostering confidence in complex numerical answers. 2. Tutorial Sessions (1 Hour/Week) The dedicated tutorial hour will be a focused setting for drilling analytical skills and addressing specific student confusion. Targeted Practice: The primary goal is mastery of core calculation techniques. Tutors guide students through solving challenging homework problems related to rotational dynamics, collisions, or the application of the Bernoulli equation. Conceptual Q&A: Dedicate time to clarifying difficult concepts like the difference between mass moment of inertia and centroid, or the physical significance of the Reynolds number. Use short, focused concept checks at the start of the session. FBD and System Definition Review: Provide rapid, constructive feedback on students' technique in setting up dynamic Free-Body Diagrams (FBDs) and properly defining control volumes for fluid problems, as these are the critical first steps in problem-solving. Peer Instruction: Facilitate students explaining one complex concept (e.g., general plane motion) or one problem solution to a small group of peers, reinforcing their own mastery.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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**	Around 6	10% (10)	every two weeks	LO #3, #4,#6, #7, #9 and #14,
	Assignments	Around 6	10% (10)	every two weeks	LO #7, #8, #9, #10, #12 and #14.
	Report	1	10% (10)	10	LO #6, #9, #11 and #13.
Summative assessment	**Midterm Exam**	2hr	20% (10)	7	LO #1-#10
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Dynamics – Concepts, motion types, coordinate systems
Week 2	Kinematics of Particles – Rectilinear & curvilinear motion
Week 3	Kinetics of Particles (Newton's Laws) – F = ma applications
Week 4	Work–Energy Principle – Kinetic & potential energy, power
Week 5	Impulse–Momentum Principle – Linear momentum, collisions
Week 6	Systems of Particles – Mass center, linear & angular momentum
Week 7	Rigid Body Kinematics – Rotation about axes, plane motion
Week 8	Rigid Body Kinetics – Moments of inertia, equations of motion
Week 9	Vibration Fundamentals – Simple harmonic motion (SHM)
Week 10	Introduction to Fluids – Fluid properties, pressure, density
Week 11	Fluid Statics – Pascal's law, buoyancy, manometry
Week 12	Fluid Dynamics – Continuity & Bernoulli equations
Week 13	Internal Flow & Losses – Reynolds number, laminar vs turbulent flow
Week 14	Applications in Robotics – Hydraulic & pneumatic actuation, cooling
Week 15	Review & Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Hibbeler, R. C., Engineering Mechanics: Dynamics, 15th Ed. 2. Cengel, Y. A., & Cimbala, J. M., Fluid Mechanics: Fundamentals and Applications, 5th Ed.	No

Recommended Texts	3. Halliday, D., Resnick, R., & Walker, J., Fundamentals of Physics, 12th Ed.	No

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
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	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	***Python programming***			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PYPR126**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	AI & Robotics Engineering		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Marwah Mohammed Mosa		**e-mail**	Marwah.m@aliraqia.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	The main objectives of this module are to: 1. Introduce students to the Python programming environment, including its syntax, features, and development tools. 2. Develop foundational skills in Python programming, including variables, data types, expressions, and control flow. 3. Enable students to design, implement, and test Python programs. 4. Apply Python to mathematical computations and problem-solving using basic math functions and libraries. 5. Compare programming concepts in Python and C to understand differences in syntax, control structures, and problem-solving approaches. 6. Familiarize students with Python libraries, including installation, importing, and utilization of built-in and external packages. 7. Introduce basic data handling techniques using NumPy and Pandas for efficient data manipulation and preparation. 8. Develop skills in visualizing data using Matplotlib, including creating charts and graphs for analysis. 9. Enable object-oriented programming by creating and using classes in Python. 10. Promote modular and organized coding practices by structuring code. 11. Introduce error and exception handling mechanisms to ensure program robustness and reliability. 12. Provide an overview of AI programming using TensorFlow and Keras, including basic model concepts, data splitting, and performance evaluation. 13. Encourage hands-on programming, problem-solving, and project-based learning to reinforce practical application of Python and AI concepts.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate proficiency in the Python programming environment, including writing, compiling, and executing Python programs. 2. Apply fundamental programming concepts such as variables, data types, expressions, and control structures to solve computational problems. 3. Design, implement, and test Python functions to create a modular. 4. Perform mathematical computations and solve basic engineering or scientific problems using Python built-in functions and libraries. 5. Compare Python and C programming constructs to select appropriate approaches for problem-solving. 6. Utilize Python libraries effectively, including importing, installing, and applying built-in and third-party packages. 7. Process and manipulate data using NumPy and Pandas for basic data analysis tasks. 8. Visualize data by creating charts, graphs, and plots using Matplotlib to support data interpretation and reporting. 9. Implement object-oriented programming concepts, including creating and using classes and objects in Python.

	10. Organize Python programs into modules to enhance code readability, reusability, and maintainability. 11. Handle errors and exceptions in Python programs to ensure robustness and reliability. 12. Demonstrate introductory knowledge of AI model development using TensorFlow and Keras, including dataset handling, model training, and evaluation. 13. Apply programming skills in practical, project-based tasks that integrate Python programming, data handling, and AI concept
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1. Course Orientation and Overview: Introduction to the course, learning outcomes, Python environment setup, development tools, and understanding program execution. 2. Basic Python Concepts: Variables, constants, data types, expressions, and basic operators. 3. Functions in Python: Definition and purpose of functions, benefits, types, and return values. 4. Python for Mathematics Applications: Using built-in Python functions for basic mathematical computations and problem-solving . 5. Comparative Programming Python and C (Conditional Statements): Understanding and applying if statements, logical conditions, and decision-making in Python compared to C. 6. Comparative Programming Python and C(Loop Statements): Implementing iterative computations using for, while, and do-while equivalents in Python, highlighting similarities and differences with C. 7. Working with Python Libraries: Introduction to Python libraries, installing and importing packages, using built-in functions, and extending functionality with external libraries. 8. Introduction to Basic Data Handling with NumPy and Pandas: Loading, importing, and working with NumPy and Pandas libraries. 9. Visualizing Data with Matplotlib: Creating simple charts and graphs, and customizing plots, 10. Creating Classes in Python: Introduction to defining classes, and creating classes. 11. Modular Programming in Python: Organizing code into modules.. 12. Error and Exception Handling in Python: Detecting and handling syntax and runtime errors using try, and except. 13. Introduction to TensorFlow and Keras Libraries: Basics of deep learning frameworks, creating simple models, and understanding the workflow for model development. 14. Overview on AI Model Concepts:

	Introduction to concepts of data splitting, training, evaluation, and performance metrics for basic AI models. 15. Review and Assessment: [5Hours] - Review of key concepts and techniques - Practice problems and exercises - Summative assessments (quizzes, tests, or exams)

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Course orientation and overview; Introduction to Python
Week 2	Basic Python Concepts: Variables, data types.
Week 3	Functions in Python: What is a Function Benefits, Defining, types, and how Functions work
Week 4	Python for Mathematics Applications (Basic Math Functions)
Week 5	Comparative Programming Python and C: Conditional Statements (if)
Week 6	Comparative Programming Python and C: Loop Statements
Week 7	Working with Python Libraries: Introduction to libraries, installing and importing library packages, and built-in functions.
Week 8	Mid-course Exam
Week 9	Introduction to Basic Data Handling with NumPy and Pandas
Week 10	Visualizing Data with Matplotlib Creating simple charts and graphs to understand data.
Week 11	Creating Classes in Python
Week 12	Modular Programming in Python: how to organize code into modules

Week 13	Error and Exception Handling in Python: Syntax Errors, Try and Except
Week 14	Introduction to TensorFlow and Keras libraries
Week 15	Overview on AI Model Concepts (Data Splitting & Performance Metrics)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Exploring Python Environment and Editors
Week 2	Lab 2: Working with Variables, Data Types, and Math Application Practice
Week 3	Lab 3: Conditional Statements and a Review of the Comparison Between C and Python
Week 4	Lab 4: Loops and a Review of the Comparison Between C and Python
Week 5	Lab 5: Exploring Python Standard Libraries(NumPy and Pandas) and Packages
Week 6	Lab 6: Visualizing Data with Matplotlib: Creating Simple Charts
Week 7	Lab 7: Defining and Using Functions in Python
Week 8	Lab 8: Exception Handling and Programming
Week 9	Lab 9: Using TensorFlow and Keras libraries; Overview on using libraries with AI Model
Week 10	Lab 10: Building a Simple AI Model using TensorFlow & Keras

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures and Interactive Sessions: Delivering conceptual knowledge on Python programming, computer science fundamentals, and AI model concepts, with active student participation and Q&A.

	2. Demonstrations and Live Coding: Practical demonstrations of Python code, libraries, and AI frameworks to illustrate concepts in real-time and enhance understanding. 3. Hands-on Laboratory Sessions: Supervised exercises in programming labs to practice coding, data handling, visualization, and AI model implementation using Python. 4. Problem-Solving Workshops: Structured exercises to develop logical thinking, algorithm design, and debugging skills, reinforcing the application of Python in engineering and scientific contexts. 5. Project-Based Learning: Small individual or group projects integrating Python programming, data analysis, and AI concepts to develop problem-solving, teamwork, and project management skills. 6. Self-Directed Learning: Encouraging students to explore Python libraries, AI tools, and additional programming challenges beyond classroom instruction to foster independent learning. 7. Comparative Analysis Activities: Activities comparing Python and C programming constructs to enhance understanding of programming paradigms and selection of appropriate techniques. 8. Assessment and Feedback: Regular formative assessments, quizzes, and code reviews with feedback to guide student progress and reinforce learning outcomes. 9. Discussion and Reflection: Group discussions, peer reviews, and reflective activities to encourage critical thinking, problem-solving strategies, and application of theoretical concepts to practical scenarios.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	81	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	44	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

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

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.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Lutz, M. (2009). *Learning Python* (4th ed.). O'Reilly Media. 2.Halvorsen, H.-P. (2019). Python Programming. Norway: Author. ISBN 978-82-691106-4-7.	Yes
Recommended Texts	OpenStax. (2024). Introduction to Python Programming. Rice University. Retrieved from https://openstax.org/details/books/introduction-python-programming	Yes
Website	https://onecompiler.com/python https://www.canva.com/online-whiteboard/flowcharts/ https://onecompiler.com/python	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Circuits**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ELCI127**				
ECTS Credits	6				
SWL (hr/sem)	**150**				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	AI & Robotics Engineering		**College**	College of Engineering	
Module Leader	Hiba Hadi Kurdi		**e-mail**	hiba.h.kurdi@aliraqia.edu.iq.	
Module Leader's Acad. Title	Assist. Lecturer		**Module Leader's Qualification**	MSc.	
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	14. Understand the fundamental principles of electric circuits, including voltage, current, resistance, and power, and explain their interrelationships as governed by Ohm's law.

	15. Analyze and solve direct current (DC) circuits using systematic approaches such as series-parallel analysis, voltage division, and current division methods. 16. Apply Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) to perform detailed analysis of complex DC networks. 17. Evaluate and compute the equivalent resistance of resistors in series and parallel connections to simplify multi-resistor configurations. 18. Employ advanced circuit analysis methods, including nodal and mesh analysis, to determine voltage, current, and power relationships within electrical circuits. 19. Apply key circuit theorems—such as Superposition, Thevenin's, and Norton's theorems—to simplify and analyze DC circuits for unknown parameters.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	14. Demonstrate a clear understanding of fundamental electrical concepts, including voltage, current, resistance, and power, and effectively apply Ohm's law to analyze and solve basic electrical circuits. 15. Analyze and solve direct current (DC) circuits using systematic methods such as Kirchhoff's laws, nodal analysis, and mesh analysis, and accurately determine voltage drops, current distribution, and power dissipation. 16. Identify and describe the behavior of essential circuit components, particularly resistors, and compute equivalent resistance for series and parallel connections to simplify complex networks. 17. Apply major circuit theorems, including the Superposition, Thevenin, and Norton theorems, to simplify and solve complex DC circuits and determine unknown circuit parameters. 18. Develop proficiency in circuit analysis techniques through interpreting circuit diagrams, identifying circuit elements, and applying structured problem-solving approaches to determine voltage, current, and power relationships. 19. Gain practical experience through laboratory experiments by constructing electrical circuits, using measurement instruments, and verifying theoretical concepts through experimental observation and data analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 16. Introduction to Electric Circuits: - Basic concepts of voltage, current, resistance, and power - Circuit elements: resistors, capacitors, and inductors - Circuit diagrams and symbols 17. Ohm's Law and DC Circuit Analysis: - Ohm's law and its applications - Series and parallel circuits - Voltage and current division - Power calculations in DC circuits 18. Equivalent Resistance and Circuit Simplification: - Equivalent resistance in series and parallel circuits - Voltage and current division using equivalent resistances - Circuit simplification techniques 19. Kirchhoff's Laws and Circuit Analysis Techniques: - Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL) - Nodal analysis and mesh analysis

	20. Circuit Analysis using Circuit Theorems: - Application of superposition theorem - Thevenin's theorem and Norton's theorem - Maximum power transfer theorem 21. 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 implementation of this module will focus on promoting active student engagement and developing critical thinking skills. This will be achieved through a combination of classroom lectures, interactive tutorial sessions, and engaging, hands-on experiments designed to reinforce key concepts through practical application.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	81	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	69	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	٦
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	6 and 12	LO #1, #2, #3 and #4
	Assignments	2	10% (10)	7 and 13	LO #1 and #5
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #3 and #4
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	Basic concepts, systems of units, Electric charge, current, voltage, power and Ohm's law
Week 2	Kirchhoff's Laws, Kirchhoff's Voltage Law, Kirchhoff's Current Law (Series dc Circuits and Parallel dc Circuits)
Week 3	Conversion of delta - connected resistance into an equivalent Wye connection & Vic versa
Week 4	Nodal Analysis and Mesh Analysis Superposition theorem and its application.
Week 5	Thevenin's and Norton's theorems and maximum power transfer theorem
Week 6	1. Definition and characteristics of alternating current. 2. Generation and waveform representation of AC. 3. Relationships and definitions of RMS value, average value, and their significance.

Week 7	**Mid-Exam**
Week 8	Analyses of Alternating Current Circuits
Week 9	Phasor Relationships for AC Circuit Elements, voltage and current relations in pure resistive inductive and capacitive circuits.
Week 10	Series and Parallel Configuration in AC Circuit
Week 11	Network Theorems in AC circuits, Superposition, Thevenin's Theorem, Norton's Theorem.
Week 12	Power in AC circuits, Average power and power factor, Power Factor.
Week 13	Apparent power, Reactive Power
Week 14	complex power and power triangle:
Week 15	Review and revision
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	**English Language I**			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	ENLA102			☐ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	AI & Robotics Engineering		**College**	College of Engineering	
Module Leader	Ahmed Sabah Noori		**e-mail**	ahmedsabahnoori@aliraqia.edu.com	
Module Leader's Acad. Title	Lecturer:		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/10/2025		**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. Language Proficiency: English language materials aim to enhance learners' proficiency in the language by developing their skills in reading, writing, listening, and speaking. The materials provide opportunities for learners to practice and improve their grammar, vocabulary, pronunciation, and comprehension abilities. 2. Communication Skills: English language materials focus on developing learners' ability to communicate effectively in various contexts. This includes practicing conversation skills, giving presentations, writing emails and reports, and engaging in discussions and debates. 3. Cultural Understanding: English language materials often incorporate cultural content to provide learners with insights into English-speaking countries' cultures, traditions, and societal norms. This helps learners understand and navigate cross-cultural interactions. 4. Exam Preparation: Many English language materials are designed to prepare learners for standardized tests like TOEFL, IELTS, or Cambridge English exams. These materials provide test-taking strategies, practice exercises, and sample questions to familiarize learners with the exam format and improve their performance. 5. Professional and Academic Skills: Some English language materials cater to learners who require English proficiency for specific professional or academic purposes. These materials focus on developing specialized vocabulary, writing research papers, delivering professional presentations, and enhancing critical thinking and analytical skills. 6. Self-Study and Autonomy: English language materials often aim to empower learners to become independent and autonomous language learners. They provide self-study resources, interactive exercises, and feedback mechanisms that allow learners to track their progress and take control of their learning journey.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Language Proficiency: By engaging with English language materials, learners should demonstrate improved language proficiency across various skills such as reading, writing, listening, and speaking. They should be able to comprehend and produce English texts with increased accuracy, fluency, and complexity. 2. Effective Communication: Learners should develop the ability to communicate effectively in English, both orally and in writing. They should be able to express ideas, opinions, and information clearly and coherently, adapting their language to different contexts and audiences. 3. Cultural Awareness: Engaging with English language materials should foster cultural awareness and sensitivity. Learners should gain an understanding of cultural practices, perspectives, and norms of English-speaking countries, enabling them to engage in cross-cultural communication with respect and understanding. 4. Critical Thinking and Analysis: English language materials often aim to develop learners' critical thinking and analytical skills. They should be able to

	analyze and evaluate information, identify main ideas, make connections, and draw conclusions from English texts. 5. Exam Readiness: If the materials are geared towards exam preparation, the learning outcomes may include achieving a specific score or level in standardized English proficiency tests such as TOEFL, IELTS, or Cambridge exams. Learners should demonstrate the necessary skills and strategies to succeed in these exams. 6. Independent Learning: English language materials often aim to promote independent learning skills. Learners should become self-directed and motivated language learners who can set goals, manage their learning process, and use resources effectively to continue improving their English proficiency beyond the module. 7. Academic or Professional Skills: Depending on the module's focus, the learning outcomes may include specific academic or professional skills. These may include academic writing, research skills, presentation skills, business communication, or specific English language skills required in a professional field.
Indicative Contents المحتويات الإرشادية	1. Vocabulary: English language materials often include vocabulary lessons and exercises to expand learners' word knowledge. This may involve learning new words, idioms, phrasal verbs, and collocations, as well as practicing their usage in context. 2. Grammar: English language materials typically cover various grammar topics and rules. They provide explanations, examples, and exercises to help learners understand and apply grammatical structures correctly. This may include topics like tenses, articles, prepositions, verb forms, and sentence structure. 3. Reading Comprehension: English language materials incorporate reading passages of different genres, such as fiction, non-fiction, news articles, and academic texts. Learners engage in activities like reading for gist, scanning for specific information, and comprehending main ideas, supporting details, and inference. 4. Writing Skills: English language materials focus on developing learners' writing skills, including sentence construction, paragraph development, essay structure, and formal writing styles. They may cover various types of writing, such as descriptive, narrative, argumentative, and persuasive writing. 5. Listening Comprehension: English language materials include listening activities to improve learners' listening skills and comprehension. These may involve listening to dialogues, conversations, lectures, interviews, and audio recordings, followed by tasks to assess understanding, inference, and note-taking. 6. Speaking Skills: English language materials provide opportunities for learners to practice speaking and develop their oral communication skills. This may include role-plays, discussions, presentations, and speaking tasks that simulate real-life situations and promote fluency, pronunciation, and accuracy. 7. Pronunciation and Intonation: English language materials often address pronunciation and intonation patterns to improve learners' spoken English.

	They may include exercises for practicing individual sounds, stress patterns, rhythm, and intonation to enhance clarity and naturalness in speaking. 8. Cultural and Societal Context: English language materials may incorporate cultural content to provide learners with insights into English-speaking countries' cultures, customs, and societal norms. This helps learners understand cultural context and improve their intercultural communication skills. 9. Test Preparation: If the materials are designed for exam preparation, they may include sections dedicated to practicing test-taking strategies, familiarizing learners with the format and types of questions in standardized English proficiency exams, and providing sample tests for practice. 10. Authentic Materials: English language materials often include authentic materials like newspaper articles, blogs, videos, and audio recordings to expose learners to real-life language usage and promote their understanding of English in authentic contexts.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. English language materials often follow a structured progression, starting with simpler concepts and gradually increasing the complexity. This scaffolding approach helps learners build upon their existing knowledge and skills, ensuring a smooth and gradual learning curve. 2. English language materials provide contextualized examples and practice exercises to help learners understand how language is used in real-life situations. By presenting language in meaningful contexts, learners can grasp its practical application and improve their comprehension and usage. 3. English language materials incorporate interactive activities like group discussions, role-plays, pair work, and language games to foster active participation and engagement. These activities promote communication, collaboration, and the application of language skills in authentic situations. 4. English language materials aim to integrate the four language skills (reading, writing, listening, and speaking) to promote holistic language development. By connecting these skills, learners can enhance their overall language proficiency and ability to communicate effectively. 5. English language materials provide a variety of practice exercises that gradually increase in difficulty. This progressive practice allows learners to reinforce their understanding, practice new language features, and build confidence in their language abilities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	34	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	16	**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 and 10	
	Assignments	2	10% (10)	2 and 12	
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered

Week 1	**Grammer (1)** (tenses: present, past, future), question, questions word, **Everyday English** (social expression)
Week 2	**Grammer (2): Present** tenses (present simpl, present continuous (have and have got) **Everyday English** (Making conversation)
Week 3	**Grammer** (**3)** Past tenses (past simple, past continuous) **Vocabulary** (Regular and Irregular verbs), Adverbs **Everyday English** (Saying when)
Week 4	**Grammer (4):** Quantity, articles **Everyday English** (Can you came for dinner, Requests
Week 5	**Grammer (5) :** Verbs patterns, future forms **Vocabulary**: Phrasal verb (literal, Idiomatic) **Everyday English** (Expressing doubt and certainty)
Week 6	**Grammer** (6): what like, Comparative and superlative adjective **Everyday English**: What's on
Week 7	**Grammer (7):** Present perfect, Indefinite past, ever and never **Everyday English:** Agree with me, word with two meaning, go together, prepositions.
Week 8	**Vocabulary** (right word, wrong word, verbs with similar meaning, adjective and noun that go together, Synonyms, Antonyms
Week 9	Writing practice: narrative or descriptive essays
Week 10	Midterm Exam
Week 11	**Speaking**: speaking a technical report, a seminar, **Team works activities** (discussion and conversation) **Seminar skills**
Week 12	Grammar review: passive voice and relative clauses.
Week 13	Error analysis and correction exercises

Week 14	**Translation**: a technical report from English to Arabic and from Arabic to English Computer engineering terms.
Week 15	Preparatory week before the final Exam
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Textbooks	1. New Headway for Beginner / Student book 4th edition 2. New Headway Elementary / Student book 4th edition	Yes
Recommended Texts	New Headway of Oxford / Pre- Intermediate / Student's Book Fourth edition	-
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.