MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mechanics**			**Module Delivery**	
Module Type	**Basic learning activities**			☒**Theory** ☐**Lecture** ☐ **Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**AIR11006**				
ECTS Credits	**5**				
SWL (hr/sem)	125				
Module Level			**Semester of Delivery**	1	
Administering Department	AI & Robotics		**College**	Engineering	
Module Leader	Dr. Aws Khalid Ibrahim		**e-mail**	aws.khalid@kus.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D	
Module Tutor	Dr. Aws Khalid Ibrahim		**e-mail**	aws.khalid@kus.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce the fundamental laws and principles governing static and dynamic systems in engineering. 2. To develop the ability to analyze and resolve force systems in two and three dimensions. 3. To enable students to apply Newton's laws and vector methods to solve mechanical problems. 4. To teach the construction and use of free-body diagrams for equilibrium analysis. 5. To provide understanding of frictional forces and their engineering applications. 6. To introduce the principles of work and energy through the concept of virtual work. 7. To lay the foundation for dynamics through the study of particle kinematics and kinetics. 8. To enhance students' analytical reasoning, problem-solving, and application of theoretical mechanics to real-world engineering contexts.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define the basic concepts of mechanics, including force, mass, and motion, and distinguish between scalars and vectors. 2. Apply Newton's laws of motion to model and solve static and dynamic problems. 3. Analyze two-dimensional and three-dimensional force systems and determine their resultants. 4. Draw and interpret free-body diagrams for particles and rigid bodies in equilibrium. 5. Apply equilibrium equations to two- and three-dimensional structures and mechanical systems. 6. Explain and compute the effects of friction in engineering applications. 7. Understand and apply the principle of virtual work for equilibrium analysis. 8. Describe particle motion in terms of displacement, velocity, and acceleration, and apply kinetic equations of motion. 9. Demonstrate the ability to solve engineering problems systematically using vector and analytical approaches.
Indicative Contents المحتويات الإرشادية	Introduction to Statics Covers fundamental mechanics concepts, including force, mass, weight, particle systems, and rigid bodies. Introduces scalar and vector quantities, vector addition,

	and Newton's laws of motion. Students also learn about the law of gravitation and standard units used in mechanics. [6 hrs] Two-Dimensional Force Systems Students analyze planar force systems through vector components, moments, and couples. Emphasis is placed on the use of the parallelogram law, rectangular components, and calculation of resultants. Practical examples illustrate the use of equilibrium and resultant forces in 2D systems. [8 hrs] Three-Dimensional Force Systems Extends force analysis into three-dimensional space. Students learn to resolve and combine forces, compute moments and couples, and determine resultants using vector algebra. Applications include real-world structures and mechanical assemblies in 3D. [8 hrs] Equilibrium in Two and Three Dimensions Focuses on equilibrium conditions for particles and rigid bodies. Students learn to isolate systems using free-body diagrams and apply equilibrium equations ($\Sigma F = 0$, $\Sigma M = 0$) in both 2D and 3D contexts. Engineering examples include frames, machines, and trusses. [10 hrs] Friction Phenomena Introduces the concept of friction, its physical basis, and types (static, kinetic, rolling). Students study dry friction and its applications in mechanical design such as wedges, belts, and screw systems. [6 hrs] Principle of Virtual Work Students explore the principle of work and energy, including the work done by a force or couple and the conditions for equilibrium based on virtual work. This provides a conceptual bridge between statics and dynamics. [6 hrs] Introduction to Dynamics Introduces kinematics of particles — displacement, velocity, and acceleration — and their vector representation. Covers rectilinear motion and the relationship between motion and applied forces. [6 hrs] Kinetics of Particles Students apply Newton's second law to particle motion, relating force, mass, and acceleration. Real-life problems are solved involving linear motion, variable forces, and momentum. [6 hrs] Review and Final Exam Preparation A comprehensive review of all topics. Students consolidate knowledge of statics and dynamics through problem-solving and discussion of integrated engineering examples. [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Interactive lectures will provide theoretical knowledge on engineering mechanics concepts, techniques, and applications. 2. Tutorial Sessions: Hands-on laboratory sessions will allow students to practice and develop skills in engineering mechanics (statics and dynamics). 3. Case Studies: Analysis of real-world examples and case studies will help students understand the practical applications of engineering mechanics. 4. Independent Research Projects: Students will be encouraged to undertake independent research projects using engineering techniques to gain practical experience and develop research skills. 5. Group Discussions: Group discussions and peer-to-peer learning will foster collaboration and deeper understanding of statics and dynamics concepts. 6. Assessments: including quizzes, laboratory reports, and a final examination, will evaluate students' understanding of theoretical knowledge and their ability to apply engineering mechanics methods.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5,10	
	Assignments	1	10% (10)	11	
	Projects / Lab.	1	10% (10)	12	
	Report	1	10% (10)	7	
Summative assessment	Midterm Exam	2hr	10% (10)		
	Final Exam	3hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to statics** • Mechanics, Basic Concepts, Scalars and Vectors. • Newton's Laws, Units, and Law of Gravitation.
Week 2	**Two-dimensional force systems** • Rectangular Components of 2D forces
Week 3	**Two-dimensional force systems** • Moment and Couple
Week 4	**Two-dimensional force systems** • Resultants of 2D forces
Week 5	**Three-dimensional force systems** • Rectangular Components of 3D forces
Week 6	**Three-dimensional force systems** • Moment and Couple
Week 7	**Three-dimensional force systems** • Resultants of 3D forces
Week 8	**Class Discussions and Mid-term exam**
Week 9	**Equilibrium in Two Dimensions** • System Isolation and the Free-Body Diagram of 2D systems • Equilibrium Conditions •

Week 10	**Equilibrium in Three Dimensions** • Free-Body Diagram of 3D systems • Equilibrium Conditions •
Week 11	**Friction Phenomena** • Types of friction. • Dry friction. •
Week 12	**Virtual Work** • Work of a force and a couple. • Equilibrium conditions in terms of virtual work. •
Week 13	**Introduction to Dynamics** • Kinematics of particles. • Rectilinear motion (velocity and acceleration). •
Week 14	**Kinetics of Particles** • Equation of motion • Rectilinear motion (force and mass)
Week 15	**Review and Final Exam Preparation** • Comprehensive course review and revision. •

Delivery Plan (Weekly Tutorial Syllabus) المنهاج الاسبوعي لدرس التمرين	
	Material Covered
Week 1	**Introduction to statics** • Description of Mechanics, Basic Concepts, Scalars and Vectors. • practice of Newton's Laws, Units, and Law of Gravitation.
Week 2	**Two-dimensional force systems** • Problems in Rectangular Components of 2D forces
Week 3	**Two-dimensional force systems** • Tutorial in Moment and Couple
Week 4	**Two-dimensional force systems** • Problems in Resultants of 2D forces
Week 5	**Three-dimensional force systems** • Tutorial in Rectangular Components of 3D forces
Week 6	**Three-dimensional force systems** • Problems in Moment and Couple
Week 7	**Three-dimensional force systems** • Tutorial in Resultants of 3D forces
Week 8	**Class Discussions and Mid-term exam**
Week 9	**Equilibrium in Two Dimensions** • Practice of the Free-Body Diagram of 2D systems • Solving problems about Equilibrium Conditions
Week 10	**Equilibrium in Three Dimensions** • Practice of the Free-Body Diagram of 3D systems • Solving problems about Equilibrium Conditions
Week 11	**Friction Phenomena** • problems in case studies of friction .
Week 12	**Virtual Work** • Practice Work of a force and a couple. • Solving problems in Equilibrium conditions for virtual work.

Week 13	**Introduction to Dynamics** • Description of Kinematics of particles. • Tutorial in Rectilinear motion (velocity and acceleration).
Week 14	**Kinetics of Particles** • Interpretation of Equation of motion • Tutorial in Rectilinear motion (force and mass)
Week 15	**Review and Final Exam Preparation** • Comprehensive course review and revision.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. James L. Meriam , L. G. Kraige , J. N. Bolton, 2016 . Engineering Mechanics: Statics, 8th ed. John Wiley & Sons Singapore Pte. Ltd. 2. James L. Meriam , L. G. Kraige , J. N. Bolton, 2015 . Engineering Mechanics: Dynamics, 8th ed. John Wiley & Sons.	yes
Recommended Texts	1. Russell Hibbeler, 2015. Engineering Mechanics: Statics & Dynamics 14th ed.	
Websites	https://www.engineer4free.com/statics.html https://www.engineer4free.com/dynamics.html	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Discrete logic**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**AIR11007**				
ECTS Credits	**5**				
SWL (hr/sem)	125				
Module Level			**Semester of Delivery**	1	
Administering Department	AI & Robotics		**College**	Engineering	
Module Leader	Dr. Zaid Al-Shammari		**e-mail**	Zaid.shaker.elc@kus.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D	
Module Tutor	Lec. Ahmed Sabri		**e-mail**	eng.ahmed.sabri@kus.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This module aims to : 1. To introduce students to the fundamental principles of digital systems and their applications. 2. To distinguish between analog and digital signals and understand the advantages of digital systems. 3. To develop proficiency in number systems, binary arithmetic, and data representation. 4. To teach the design and simplification of logic circuits using Boolean algebra and Karnaugh maps. 5. To explain combinational logic circuits and their real-world applications. 6. To introduce sequential logic circuits, including flip-flops, counters, and registers. 7. To enhance problem-solving and design skills for digital systems in AI, robotics, and automation. 8. To prepare students for advanced courses in digital electronics, computer architecture, and embedded systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the difference between analog and digital signals and describe the role of digital systems in modern engineering. 2. Convert numbers between binary, octal, decimal, and hexadecimal systems, and perform binary arithmetic operations. 3. Construct and interpret truth tables for basic and complex logic gates. 4. Apply Boolean algebra laws and theorems to simplify logic expressions and circuits. 5. Use Karnaugh maps to minimize logic functions and design optimized circuits. 6. Design basic combinational logic circuits, including adders, subtractors, multiplexers, demultiplexers, encoders, and decoders. 7. Explain the principles of sequential circuits, including latches, flip-flops, and memory elements. 8. Design counters, registers, and sequential systems using flip-flops and timing diagrams. 9. Apply digital logic concepts to real-world problems in robotics, AI, and automated control systems. 10. Demonstrate systematic problem-solving and circuit design skills in digital logic projects.
Indicative Contents المحتويات الإرشادية	Introduction to Digital and Analog Systems This section covers the basic distinction between analog and digital signals, their advantages and limitations, and practical applications in AI and robotics. Students

	explore how digital systems form the backbone of modern computational and control technologies. [5 hrs] Number Systems and Binary Arithmetic Students study binary, octal, decimal, and hexadecimal systems, including number conversions and binary arithmetic operations. Exercises emphasize accuracy in representation and computation, preparing students for circuit design and digital data manipulation. [8 hrs] Logic Gates and Truth Tables This section introduces the basic logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR), their symbols, truth tables, and practical applications. Students learn to represent logical functions using gates and analyze simple logic circuits. [8 hrs] Boolean Algebra and Karnaugh Map Simplification Students learn Boolean algebra laws and theorems to simplify expressions. Karnaugh maps are used to minimize logic functions efficiently, enabling optimized circuit design for real-world engineering problems. [10 hrs] Combinational Logic Circuits Topics include the design of half and full adders, subtractors, multiplexers, demultiplexers, encoders, and decoders. Students practice constructing combinational circuits for practical applications in AI, robotics, and automated systems. [12 hrs] Sequential Logic Circuits Introduction to sequential logic, including memory concepts, latches, flip-flops (SR, JK, D, T), edge-triggering, and clock behavior. Students learn to design counters, registers, and sequence-generating circuits using flip-flops and timing diagrams. [15 hrs] Applications of Combinational and Sequential Logic This section focuses on implementing control logic and decision-making circuits in robotics and automation. Case studies demonstrate how digital logic solves real-world engineering problems, bridging theory and practice. [12 hrs] Revision and Problem-Solving Comprehensive exercises cover all topics, reinforcing problem-solving, circuit design, and analytical reasoning. Students consolidate their knowledge and prepare for exams and project applications. [17 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Interactive Lectures: Provide theoretical knowledge on core concepts such as number systems, Boolean algebra, and the operation of combinational and sequential logic circuits. 2. Hands-on Laboratory Sessions: Allow students to build and test logic circuits using hardware (like breadboards and ICs) or simulation software (e.g., Logisim). This develops practical skills in circuit implementation, analysis, and troubleshooting. 3. Problem-Solving Exercises: Focus on applying Boolean algebra and Karnaugh maps to simplify logic expressions and design optimized circuits. 4. Case Studies and Applications: Analyze real-world examples of how digital logic is used in robotics, AI, and automated control systems, bridging theory and practice. 5. Group Discussions and Collaborative Projects: Encourage teamwork in designing and implementing digital logic projects, fostering a deeper understanding and shared problem-solving skills. 6. Assessments: Use quizzes, assignments, lab reports, a mid-term exam, and a final exam to evaluate students' understanding of theoretical concepts and their ability to apply design techniques.

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Digital and Analog Systems** • Difference between analog and digital signals. • Role of digital systems in AI and robotics.
Week 2	**Number Systems and Binary Arithmetic** • Binary, octal, decimal, and hexadecimal systems. • Number conversions and binary operations.
Week 3	**Logic Gates and Truth Tables** • Basic logic operations (AND, OR, NOT, NAND, NOR, XOR, XNOR). • Circuit representation and practical examples.
Week 4	**Boolean Algebra** • Laws and theorems of Boolean algebra. • Simplifying digital circuits using Boolean expressions.
Week 5	**Karnaugh Map (K-Map) Simplification** • Logic function minimization using K-Maps. • Designing optimized logic circuits.
Week 6	**Combinational Logic Circuits – Part 1** • Half and full adders, subtractors. •Basic combinational circuit design.
Week 7	**Mid-term Exam**
Week 8	**Combinational Logic Circuits – Part 2** • Multiplexers, demultiplexers, encoders, and decoders.

	Practical Applications of Combinational Logic • Designing control and decision circuits. • Real-world examples in robotics and AI.
Week 9	**Introduction to Sequential Logic Circuits** • Basic concepts of memory and timing. • Introduction to latches and flip-flops. •
Week 11	**Flip-Flop Types and Applications** • SR, JK, D, and T flip-flops. • Edge-triggering and clock behavior. •
Week 12	**Sequential Circuits Design** • Using flip-flops to design counters and registers. • Timing diagrams and sequence generation. •
Week 13	**Counters and Shift Registers** • Asynchronous and synchronous counters. • Shift register operation and applications. •
Week 14	**Sequential Circuits – Applications** • Implementing control logic using sequential circuits. • Case studies in robotics and automation. •
Week 15	**Review and Final Exam Preparation** • Comprehensive course review and practical revision. •

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	• Introduction to the Digital Laboratory Familiarization with lab equipment (breadboard, power supply, logic probes); safety instructions and introduction to digital signals.
Week 2	• Number Systems and Logic Levels Practice binary-to-decimal conversion and verify digital HIGH/LOW levels using simple LED circuits.
Week 3	• Logic Gates – Basic Operations Build and test basic logic gates (AND, OR, NOT, NAND, NOR) using ICs; verify truth tables.
Week 4	• Logic Gates – Combined Circuits Construct compound logic expressions; analyze and test outputs using logic probes or simulation.
Week 5	• Boolean Algebra and Simplification Apply Boolean simplification on given circuits and implement simplified versions using hardware or simulation software (e.g., Logisim).
Week 6	• Karnaugh Map Practice Simplify logic functions using K-map methods and compare complexity before and after reduction.
Week 7	• Midterm Lab Evaluation Assessment on experiments from Weeks 1–6 (circuit building, analysis, and documentation).
Week 8	• Combinational Logic Circuits – Adders/Subtractors Design and implement half adder and full adder/subtractor circuits; verify functionality.
Week 9	• Combinational Circuits – MUX and DEMUX Build multiplexer and demultiplexer circuits and explore their data-routing applications.
Week 10	• Encoders and Decoders Construct simple encoder and decoder circuits and test their operation using binary inputs.
Week 11	• Introduction to Sequential Logic Observe latch and flip-flop behavior using LEDs; understand SR, D, and JK flip-flops.

Week 12	• Flip-Flop Timing and Triggering Explore clock signals and triggering (edge vs. level); measure response using oscilloscopes or simulation.
Week 13	• Counters Design and test asynchronous and synchronous counters using flip-flops or IC counters.
Week 14	• Shift Registers Implement and test serial-in/serial-out and parallel-in/parallel-out shift registers.
Week 15	• Final Lab Assessment and Demonstration

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Floyd, T.L., 2011. Digital fundamentals, 10/e. Pearson Education India.	yes
Recommended Texts	1. Shiva, S.G. ed., 2018. Introduction to logic design. CRC Press.FLOYD, Thomas L., and David BUCHLA. 2. Nixon, M.S., 2015. Digital Electronics: A Primer-Introductory Logic Circuit Design (Vol. 1). World Scientific Publishing Company.	yes
Websites	https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/	

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	**Core**			**Theory** ✓ **Lecture** **Lab** **Tutorial** ✓ **Practical** **Seminar**	
Module Code	**CEN11004**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	First		**Semester of Delivery**	1	
Administering Department			**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course discusses the fundamental concepts of engineering graphics. It gives also an introduction to computer graphics using CAD software. The following topics are aimed to covered: 1- Drawing conventions such as standards, line types and dimensioning. 2- Drawing of inclined and curved surfaces. 3- Deducting the orthographic views from a pictorial. 4- Drawing full and half sections; deducting an orthographic view from given two views. 5- Pictorial sketching (isometric and oblique).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the value of engineering graphics as a language of communication. 2. Infer the nature of engineering graphics, the relationships between 2D and 3D environments. 3. Comprehend and deduce orthographic projections of an object. 4. Visualize wide variety of objects and drawing the missing views. 5. Comprehend and deduce section views. 6. Produce three dimensional drawings utilizing CAD software. 7. Navigate the AutoCAD user interface, including menus, toolbars, and the drawing workspace. 8. Apply appropriate coordinate systems for accurate point placement in drawings. 9. Apply keyboard shortcuts and command syntax to speed up drawing operations. 10. Demonstrate printing and plotting with real examples using different configurations.
Indicative Contents المحتويات الإرشادية	• **Introduction to Engineering Drawing:** Purpose, importance, and applications of engineering drawing in engineering communication. [3 hrs] • **Drawing Instruments and Standards:** Introduction to drawing tools, line types, lettering, scales, and dimensioning standards. [4 hrs] • **Geometric Constructions:** Basic geometric constructions, tangents, arcs, polygons, and ellipse drawing methods. [6 hrs] • **Orthographic Projection:** Principles of projection, projection planes, first and third angle projections, and drawing multiple views. [6 hrs]

	• **Inclined and Curved Surfaces:** Projection and representation of inclined planes, curved surfaces, and complex shapes. [5 hrs] • **Sections and Sectional Views:** Purpose of sections, full and half sections, cutting planes, and representation of materials. [5 hrs] • **Pictorial Drawing:** Isometric, oblique, and perspective sketches; visualization of 3D objects from 2D drawings. [4 hrs] • **Dimensioning and Annotations:** Dimension types, placement rules, tolerance indication, and technical lettering. [3 hrs] • **Introduction to CAD Software (AutoCAD):** Basic interface, coordinate systems, drawing and modification commands. [4 hrs] • **CAD Drawing Applications:** Creating 2D engineering drawings, layering, scaling, and dimensioning using AutoCAD. [4 hrs] • **Printing and Plotting Techniques:** Setting up layouts, plotting views, and exporting drawings with correct scale and format. [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. **Lectures:** Explain key principles of engineering drawing supported by visual examples and demonstrations. 2. **Laboratory Work:** Apply concepts through manual sketching and CAD-based practical exercises. 3. **Demonstrations:** Use live drawing sessions to illustrate projection, sectioning, and geometric construction methods. 4. **Assignments:** Reinforce understanding through individual and group drawing tasks. 5. **Feedback and Review:** Provide continuous feedback during labs and assignments to enhance technical accuracy and skills.

Student Workload (SWL) الحمل الدراسي للطالب محسو لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10 % (8)	5, 10	LO #3, 4, 5 and 6
	Assignments	1	10 % (2)	14	LO # 3, 4, 5,6 and 7
	Projects / Lab.	15	10% (15)	Continuous	All
	Projects / Home.	15	10% (15)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	20 % (20)	7	LO # 1-5
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Introduction and Instruments
Week 2	Kufic letters
Week 3	Principles of putting dimensions: Basic dimensions, the true dimensions, extension lines, lines of dimension
Week 4 to Week 6	Geometric construction: Draw an arc touches two intersecting lines, draw arc touches two brackets, draw an arc touches a straight and passes a point, draw an ellipse, draw a hexagon, draw the quinary, draw shape with eight faces, sketching inverted arc, identify points of contact
Week 7 to 9	Projections: The theory of projection, the projection lines, oblique projection level, the vertical projection system, multiple projections, conclusion the third projected, draw curves and oblique surfaces on the projections
Week 10 to 11	Isometric: Projection by the first even angles, projection by the third even angles, draw circles on dimensional figure, draw oblique surfaces on dimensional figure, Isometric drawing and its application
Week 12 to 13	Sections: Introduction, types of sections and symmetrical sections, cutting lines, double sections, elevations sectioned, shapes sectioned
Week 14 to 15	CAD Drawing: Introduction to AutoCAD software, control page in AutoCAD software, types of coordinate, the command line and applications, the modified commands, the help orders in drawing, the commands circle, rectangle, offset, the command layers array, scale and aligned, the command arc with all options, the command polyline with options , types of dimensions with application examples, the command text and its types, preparing and printing options with examples.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	الرسم الهندسي للمؤلف عبد الرسول الخفا	1-نعم
Recommended Texts	Interpreting Engineering Drawings, Jensen, C.H. and Helsel, G.D., 7th ed., Thomson Delmar Learning, 2007	2- نعم

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	**Physics**			**Module Delivery**	
Module Type	Basic			☒**Theory** ☐ **Lecture** ☒**Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CEN11005				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	1	
Administering Department	AI & Robotics		**College**	College of Eng.	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• To introduce the fundamental concepts and branches of physics, including physical quantities, units, vectors, and the nature of electric charge, fields, and forces. • To explain the structure of atoms, types of matter, and the behavior of electric charge, emphasizing Coulomb's law, electric dipoles, and electric potential energy. • To develop understanding of basic electrical principles, including Ohm's law, resistance, capacitance, inductance, and the behavior of AC circuits • .To introduce the physics of semiconductors, including atomic configuration, carrier concentration, doping, and the distinction between intrinsic and extrinsic materials. • To describe the formation and operation of PN junctions and semiconductor diodes under forward and reverse bias.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• **Explain** the fundamental concepts and branches of physics, including physical quantities, units, vectors, and the nature of electric charge, fields, and atomic structure. • **Apply** the principles of electric charge interactions, including charging by induction and friction, Coulomb's law, and electric field analysis using field lines and dipole concepts. • **Analyze** basic DC and AC circuits by applying Ohm's law and the concepts of resistance, capacitance, and inductance, including series and parallel connections. • **Calculate** inductive and capacitive reactances (XL and XC) and evaluate circuit behavior under different electrical conditions. • **Describe** the atomic structure, electronic configuration, and carrier behavior in intrinsic and extrinsic semiconductors, including the effects of doping. • **Explain** the formation, biasing, and characteristics of PN junctions and semiconductor diodes, including Zener behavior and VI characteristics. • **Design and test** diode-based and semiconductor circuits such as rectifiers, voltage regulators.
Indicative Contents المحتويات الإرشادية	• Introduction to Physics and Physical Quantities Branches of physics, fundamental quantities, units, and vectors. Measurement systems and dimensional analysis. [4 hrs] • Electric Charge and Structure of Matter Electric charge, structure of atoms, and types of matter. Conservation of charge, charging by induction and friction. [4 hrs] • Electric Forces and Fields Electric forces on uncharged objects, Coulomb's law, and the concept of the electric field. Electric field due to a point charge and representation using field lines. [5 hrs] • Electric Dipoles and Potential Energy Electric dipole concepts, forces and moments on dipoles, and electric potential energy in electrostatic systems. [3 hrs] • Current, Resistance, and Capacitance

	Ohm's law, electrical resistance, and capacitance. Capacitors in series and parallel connections. Introduction to RC circuits and their behavior. [8 hrs] • Inductance and AC Circuits Principles of inductance, inductive reactance (X_l), capacitive reactance (Xc), and basic AC circuit analysis. [8 hrs] • Physics of Semiconductors Atomic structure, electronic configuration, energy bands in solids, and types of materials (conductors, insulators, semiconductors). [5 hrs] • Carrier Concentration and Doping Intrinsic and extrinsic semiconductors, carrier generation and recombination, N-type and P-type semiconductors, and doping effects. [8 hrs] • PN Junction Theory Formation of depletion region, junction potential, and VI characteristics under forward and reverse bias conditions. [8 hrs] • Semiconductor Diodes Operating principles, actual diode characteristics, Zener region, and temperature effects. [11 hrs] • Diode Applications Load-line analysis, rectifier circuits (half-wave and full-wave). [8 hrs] • Laboratory Applications Practical experiments involving diode and transistor circuits, measurements, analysis, and verification of theoretical concepts. [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• **Lectures:** Present key concepts from basic physics to semiconductor theory using visuals, simulations, and real-world examples. • **Tutorials:** Reinforce understanding through problem-solving on electric fields, circuits, and semiconductor behavior. • **Laboratory Work:** Conduct hands-on experiments on electrical circuits, PN junctions, and diode characteristics. • **Active Learning:** Encourage participation through discussions, demonstrations, and short in-class activities. • **Independent Study:** Support self-learning using textbooks, online resources, and preparatory review before exams.

Student Workload (SWL) الحمل الدراسي للطالب محسو لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدرا يس المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدرا يس المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدرا يس غ ري المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدرا يس غ ري المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدرا يس الك يل للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Branches of physics, Fundamental quantities ,Units, and vectors.
Week 2	Electric charge, electric field and structure of atoms, types of matter, charge is conserved, charging by induction and friction.
Week 3	Electric forces on uncharged objects, Coulomb's law.
Week 4	Electric field, electric field on a point charge, electric field lines.
Week 5	Electric dipole, forces, moments and electric potential energy.
Week 6	Ohm's Law, resistance and capacitance.
Week 7	Capacitor in series and parallel, inductive CCT.
Week 8	Inductive resistance XL, capacitive reactance XC.
Week 9	Mid exam

Week 10	Semiconductors, some definitions and the electronic configuration in atoms
Week 11	Carrier concentration in intrinsic semiconductor and doping
Week 12	Intrinsic semiconductors and extrinsic semiconductors, N - type Semiconductors , P - type semiconductors
Week 13	PN Junction: Formation of Depletion layer, Junction Potential, Forward Biased PN junction, Reverse biased PN junction.
Week 14	Semiconductor diodes: diode operating conditions, actual diode characteristics, Zener Region
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1, 2	Ohm's Law and Non Ohmic materials
Week 3,4	Electrical resonance phenomenon
Week 5,6	Generating electricity using field magnetic
Week 7,8	Calculating the electrical forces and Distance between electrical charges
Week 9,10	P.N junction diode
Week 11,12	Experience Diode properties
Week 13,14	Using a silicon transistor as a circuit switch

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	**Halliday, D., Resnick, R., & Walker, J. (2013).** Fundamentals of Physics, 10th Edition, Wiley.	yes
Recommended Texts	**Neamen, D. A. (2012).** *Semiconductor Physics and Devices: Basic Principles*, 4th Edition, McGraw-Hill Education.	yes
Websites	• HyperPhysics: https://hyperphysics.phy-astr.gsu.edu • Khan Academy (Physics & Circuits): https://www.khanacademy.org/science/physics Electronics-Notes: • https://www.electronics-notes.com	

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

6MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics**			**Module Delivery**	
Module Type	Basic learning activities			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**KUS11001**				
ECTS Credits	**5**				
SWL (hr/sem)	125				
Module Level		first	**Semester of Delivery**		1
Administering Department		AI & Robotics	**College**	Engineering	
Module Leader	Lina Lutfi Rasheed		**e-mail**	Eng.linalutfi@kus.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		MSc.`
Module Tutor			**e-mail**	Eng.linalutfi@kus.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		1	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide a solid foundation in the principles and methods of integral calculus. 2. To develop students' ability to compute indefinite and definite integrals of various functions. 3. To introduce advanced integration techniques and demonstrate their practical uses. 4. To enhance logical and analytical reasoning in mathematical problem solving. 5. To apply integration to real-life problems in geometry, physics, and related fields. 6. To encourage accuracy, clarity, and systematic approaches in mathematical computation. 7. To prepare students for further studies that require calculus-based analysis and modeling.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define and explain the concept of integration as the inverse of differentiation. 2. Solve indefinite integrals of algebraic, trigonometric, exponential, and logarithmic functions. 3. Apply integration techniques such as substitution, integration by parts, trigonometric substitution, and partial fractions. 4. Evaluate definite and improper integrals using analytical methods. 5. Interpret and apply integration to compute areas, volumes, and physical quantities. 6. Analyze convergence or divergence in improper integrals and justify solutions logically. 7. Demonstrate independent problem-solving skills through structured reasoning and verification of results. 8. Use mathematical notation and procedures effectively to communicate solutions and reasoning.
Indicative Contents المحتويات الإرشادية	Part A – Fundamental Concepts of Integration Definition and meaning of integration as the reverse of differentiation. Indefinite integrals of basic algebraic functions. Integration rules, substitution of variables, and standard forms. [10 hrs] Part B – Integration of Trigonometric and Transcendental Functions Integration of trigonometric, exponential, and logarithmic functions. Relationships between trigonometric identities and integrals. Special trigonometric substitutions and simplification techniques. [10 hrs] Part C – Techniques of Integration

	Integration by parts and reduction formulas. Integration by trigonometric substitution and completing the square. Integration by substitution and by partial fractions. Strategic selection of integration methods for complex expressions. [22 hrs] Part D – Applications of Integration Definite and improper integrals. Geometric applications: area under curves, area between curves, and volumes of revolution. Applications in physics, biology, and economics (work, accumulation, averages, and growth models). [15 hrs] Revision and Problem-Solving Sessions Review of key integration methods and formula recall. Mixed problem-solving and exam practice. Conceptual consolidation and guidance on common mistakes. [5 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Providing students with basic mathematical concepts and their practical applications. 2. Forming discussion groups during lectures to discuss mathematics topics and solve practical problems. 3. Giving students homework that requires self-explanations in different ways. 4. Solving problems relevant with mathematical subject.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	5-10	Lec. #2,#4,#6,#8,#10
	Assignments	1	10% (10)	2-12	Lec. #1, #3,#5,#7,#9,#11
	Projects	0	0	0	All
	Reports	1	10% (10)	2-13	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	Lec. #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	Completing the Square & Substitution Methods
Week 2	Definite Integrals & Area Under Curves
Week 3	Improper Integrals & Convergence
Week 4	Indefinite Integrals of Algebraic Functions
Week 5	Integration by Parts – Advanced Problems
Week 6	Integration by Parts – Concepts and Examples
Week 7	Integration of Advanced Trigonometric Functions
Week 8	Integration of Exponential Functions

Week 9	Integration of Logarithmic Functions
Week 10	Integration of Simple Trigonometric Functions
Week 11	Introduction to Integration & Basic Algebraic Integrals
Week 12	Partial Fraction Decomposition
Week 13	Revision and Problem-Solving
Week 14	Trigonometric Substitution Techniques
Week 15	Volumes of Revolution & Applications

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Thomas' calculus 11 ed. 2004	yes
Recommended Texts	1. Calculus 9th edition, Anton	yes
Websites	https://mediasace.utah.edu/media/t/0_2eoc2ksc	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Fundamentals of Computer Science**		**Module Delivery**
Module Type	**B**		☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☒**Practical** ☐**Seminar**
Module Code	KUS11002		
ECTS Credits	3		
SWL (hr/sem)	**48**		
Module Level	1	**Semester of Delivery**	1
Administering Department	AI and robotics	**College**	College of Engineering
Module Leader	Ahmed Adnan	**e-mail**	a.algbory@kus.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Ph.D
Module Tutor	Osama Mohammed Noori	**e-mail**	osama20111989@kus.edu.iq
Peer Reviewer Name	/	**e-mail**	/
Scientific Committee Approval Date		**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Introduce students to basic computer concepts including hardware, software, and data representation. 2. Provide understanding of the operating system and graphical user interface operations. 3. Develop basic word processing, spreadsheet, and presentation software skills. 4. Introduce the fundamentals of Internet, web browsing, and electronic communication. 5. Provide knowledge of cloud computing and modern digital collaboration tools. 6. Provide knowledge of programming using python language.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand computer hardware components and their functions. 2. Operate common operating systems and navigate through graphical user interfaces. 3. Create and edit documents using word processing software. 4. Design and manage spreadsheets using formulas and functions. 5. Develop and present professional presentations using presentation software. 6. Access and utilize the Internet effectively using web browsers and search engines. 7. Communicate through email and collaborate using cloud-based services. 8. Apply basic cybersecurity and digital ethics principles in computer usage. 9. Program basic codes and make GUIs.
Indicative Contents المحتويات الإرشادية	• **Introduction to Computer Concepts** Basic definitions, components of a computer, hardware and software overview. [3 hrs] • **Computer Components** CPU, memory, storage devices, input/output units, and peripheral components. [4 hrs] • **Operating Systems and GUI** Types of operating systems, basic commands, and file management operations.[4 hrs] • **Word Processing Software** Creating, formatting, and editing documents using Microsoft Word. [4 hrs] • **Spreadsheet Software** Data entry, formulas, charts, and functions using Microsoft Excel. [5 hrs] • **Presentation Software** Slide design, themes, transitions, and multimedia using PowerPoint. [3 hrs] • **Internet and Web Browsers** LAN/WAN basics, web browsing, search engines, and data access. [4 hrs] • **Communication Tools** Email systems, online collaboration, and cloud-based communication. [3 hrs] • **Cloud Computing and Services** Google Workspace, Office 365, and cloud storage usage. [3 hrs] • **Introduction to Python Programming** Installing Python and PyCharm, basic syntax, and simple program execution. [4 hrs]

	• **Python Programming Structures** Variables, conditions, loops, lists, and basic functions.[4 hrs] • **Basic AI Concepts** Introduction to AI, types of AI, basics of machine learning, real-world applications. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• **Lecture:** Deliver core concepts using visual presentations, demonstrations, and structured explanations. • **Discussion:** Encourage student interaction, idea exchange, and clarification of concepts through guided discussions. • **Practical Experience:** Apply theoretical knowledge through hands-on lab activities, software tasks, and real-world exercises. • **Clarification and Questions:** Provide opportunities for students to ask questions, seek clarification, and receive immediate feedback. • **Reflection:** Support student reflection on learned concepts to reinforce understanding and connect theory to practice. • **Research and Reports:** Promote independent learning through small research tasks, report writing, and exploration of additional resources.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #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	Introduction to Computer Concepts – Definition of computer, hardware, software, and data representation.
Week 2	Computer Components – CPU, memory, storage, input/output devices, and peripherals.
Week 3	Operating Systems and GUI – Types of operating systems, desktop environment, and file management.
Week 4	Word Processing Software – Creating, formatting, and editing documents using Microsoft Word.
Week 5	Spreadsheet Software – Data entry, formulas, charts, and data analysis using Microsoft Excel.
Week 6	Presentation Software – Slide design, themes, transitions, and multimedia using PowerPoint.
Week 7	Internet and Web Browsers – LAN/WAN basics, search engines, and safe browsing.
Week 8	Communication Tools – Email systems, online collaboration, and digital communication ethics.
Week 9	Cloud Computing and Services – Google Workspace, Office 365, and cloud storage applications.
Week 10	Introduction to Python Programming – Installing Python and PyCharm, understanding syntax and variables.
Week 11	Python Programming Basics – Data types, input/output, and simple calculations.
Week 12	Python Control Structures – Conditional statements and loops.
Week 13	Python Data Structures – Lists, strings, and basic operations.
Week 14	Basic AI Concepts – Introduction to AI, applications in daily life, and examples in Python.
Week 15	Review and Final Preparation – Revision of all topics before final exam.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	EXP 1: Exploring Computer Hardware and Operating Systems
Week 2	EXP 2: Troubleshooting and System Utilities
Week 3	EXP 3: Using Microsoft Word – Document Creation and Formatting
Week 4	EXP 4: Using Microsoft Excel – Data Entry, Formulas, and Charts
Week 5	EXP 5: Using Microsoft PowerPoint – Slide Design and Presentation
Week 6	EXP 6: Installing Python and Setting Up PyCharm Environment
Week 7	EXP 7: Python Basics – Variables, Data Types, and Input/Output
Week 8	EXP 8: Conditional Statements – if, else, and nested if
Week 9	EXP 9: Loops – for and while structures
Week 10	EXP 10: Lists and Strings – Basic Operations and Manipulation
Week 11	EXP 11: Functions – Definition, Parameters, and Return Values
Week 12	EXP 12: Simple Networking and Internet Use
Week 13	EXP 13: File Handling in Python – Read and Write Operations
Week 14	EXP 14: Mini Project – Creating a Simple Calculator or Grade Sheet using Python and Excel
Week 15	EXP 15: Final Practical Assessment – Review of Word, Excel, and Python Applications

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Brookshear, J. Glenn, Dennis Brylow, and S. Manasa. "Computer science: An overview." (2009).	Yes
Recommended Texts	Patterson, David A., and John L. Hennessy. Computer organization and design ARM edition: the hardware software interface. Morgan kaufmann, 2016. Petzold, Charles. Code: The hidden language of computer hardware and software. Microsoft Press, 2000.	No
Websites	Computer Science YouTube Channels: Channels like "Computerphile," Computer Science," and "MIT Open Courseware.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Democracy and Human Rights**			**Module Delivery**	
Module Type	**Basic learning**			☒Theory ☒Lecture ☐Lab ☐Tutorial ☐Practical ☐Seminar	
Module Code	KUS11003				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1		**Semester of Delivery**	2	
Administering Department	AI & Robotics		**College**	Engineering	
Module Leader	**Wafaa Abdul-hussein Kadhim**		**e-mail**	**Wafaa.hussein90@kus.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	١. تعريف الطلاب بمفهوم حقوق الإنسان وطبيعتها. ٢. فهم التطور التاريخي لحقوق الإنسان عبر العصور. ٣. التمييز بين حقوق الإنسان والحقوق الأخرى . ٤. دراسة حقوق الإنسان في الديانات السماوية وتأثيرها على المجتمع. ٥. التعرف على الحقوق الإنسانية في المواثيق والمعاهدات الدولية. ٦. فهم دور التشريعات الوطنية في حماية حقوق الإنسان. ٧. التعرف على نشوء المنظمات غير الحكومية وأعترافها بحقوق الإنسان . ٨. التعرف على مفهوم الديمقراطية . ٩. التعرف على مفهوم الحريات وأنواعها . ١٠. المواطنة في التشريعات والقوانين المختلفة .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	١ .تعريف حقوق الإنسان وتحديد خصائصها الأساسية. ٢ .شرح التطور التاريخي لحقوق الإنسان. ٣ .التمييز بين حقوق الإنسان والحقوق الأخرى في المجتمع. ٤ .توضيح موقف حقوق الإنسان في الديانات السماوية. ٥ .وصف الحقوق الإنسانية في المواثيق الدولية والمعاهدات. ٦ .تحليل التشريعات الوطنية لحماية الحقوق الإنسانية. ٧- التعرف على نشوء المنظمات غير الحكومية وأعترافها بحقوق الإنسان . ٨- التعرف على مفهوم الديمقراطية . ٩- التعرف على مفهوم الحريات وأنواعها . ١٠- المواطنة في التشريعات والقوانين المختلفة .
Indicative Contents المحتويات الإرشادية	•**مقدمة في حقوق الإنسان :**تعريف حقوق الإنسان، طبيعتها، والمبادئ الأساسية التي تقوم عليها. [٣ ساعات] •**التطور التاريخي لحقوق الإنسان :**مراحل تطور حقوق الإنسان عبر العصور القديمة والوسطى والحديثة. [٣ ساعات] •**خصائص حقوق الإنسان :**السمات الأساسية التي تميز حقوق الإنسان عن غيرها من الحقوق. [٣ ساعات] •**حقوق الإنسان في الديانات السماوية :**مكانة حقوق الإنسان في الشرائع السماوية وتأثيرها في المجتمعات. [٣ ساعات] •**الحقوق الإنسانية في المواثيق الدولية :**دراسة أهم الاتفاقيات والإعلانات الدولية المتعلقة بحقوق الإنسان. [٣ ساعات] •**حقوق الإنسان في التشريعات الوطنية :**حماية حقوق الإنسان في الدساتير والقوانين الوطنية. [٣ ساعات]

	•**أنواع حقوق الإنسان :**الحقوق المدنية والسياسية والاقتصادية والاجتماعية والثقافية. [٣ ساعات] •**ضمانات حقوق الإنسان :**الضمانات الداخلية والدولية التي تكفل حماية حقوق الإنسان. [٣ ساعات] •**الجزاءات المترتبة على انتهاك حقوق الإنسان :**النتائج القانونية والأخلاقية المترتبة على المساس بحقوق الإنسان. [٣ ساعات] •**المنظمات غير الحكومية :(NGOs)** نشوءها ودورها في الدفاع عن حقوق الإنسان والاعتراف الدولي بها. [٣ ساعات] •**مفهوم الديمقراطية :**تعريف الديمقراطية، مبادئها، وعلاقتها بحقوق الإنسان. [٣ ساعات] •**مفهوم الحريات :**أنواع الحريات وأهميتها في المجتمع الديمقراطي. [٣ ساعات] •**المواطنة :**مفهومها، حقوق المواطن وواجباته، وعلاقتها بالهوية الوطنية. [٢ ساعات]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	نعمد في هذا الجانب إلى ما يلي: ١- المحاضرة ٢- المناقشة ٣- الصف المقلوب ٤- دراسة الحالة

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / tutorial.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	1 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	التعريف بطبيعة حقوق الإنسان
Week 2	التطور التاريخي لحقوق الإنسان
Week 3	مميزات حقوق الإنسان عن غيرها من الحقوق
Week 4	حقوق الإنسان في الديانات السماوية
Week 5	حقوق الإنسان في المواثيق الدولية
Week 6	حقوق الإنسان في التشريعات الداخلية
Week 7	حقوق الإنسان الشخصية والاجتماعية والثقافية والاقتصادية
Week 8	ضمانات حقوق الإنسان الدولية
Week 9	ضمانات حقوق الإنسان الداخلية (الوطنية)
Week 10	الجزاءات المترتبة على المساس بحقوق الإنسان
Week 11	نشوء المنظمات غير الحكومية وأعترافها بحقوق الإنسان
Week 12	مفهوم الديمقراطية
Week 13	مفهوم الحريات وأنواعها
Week 14	المواطنة في التشريعات والقوانين المختلفة
Week 15	امتحان

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	كتاب/ حقوق الانسان (تطورها، مضامينها، حمايتها) د. رياض عزيز هادي.	Yes
Recommended Texts	كتاب/ حقوق الانسان د. حميد حنون.	No
Websites	https://www.noor-book.com/ https://www.un.org/ar/about-us/universal-declaration-of-human-rights https://ar.wikipedia.org/wiki/	

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.

	Ministry of Higher Education and Scientific Research - Iraq AL-Karkh University of Science Engineering Department of AI and Robotics	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Electrical Circuits**		**Module Delivery**
Module Type	**C**		☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐ **Practical** ☐**Seminar**
Module Code	AIR12014		
ECTS Credits	7		
SWL (hr/sem)	**175**		
Module Level	1	**Semester of Delivery**	2
Administering Department	AI and Robotics	**College**	College of Engineering
Module Leader	Zaid Al-Shammari	**e-mail**	zaid.shaker.elc@kus.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Ph.D
Module Tutor	Osama Mohammed Noori	**e-mail**	osama20111989@kus.edu.iq
Peer Reviewer Name	/	**e-mail**	/
Scientific Committee Approval Date		**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Introduce the fundamental concepts of electrical circuits**,** including current, voltage, basic circuit elements, and the passive sign convention. 2. Develop the ability to analyze DC circuits using Ohm's Law and Kirchhoff's Laws, and to simplify circuits through network reduction and series–parallel resistor combinations. 3. Understand time-varying signals in AC circuits and calculate important parameters such as average and RMS values. 4. Explain the behavior of energy storage elements, including capacitors and inductors, and analyze steady-state sinusoidal AC circuits. 5. Analyze RL, RC, and RLC circuits in both time and frequency domains, including resonance, Q-factor, and frequency response using Bode plots. 6. Apply circuit analysis techniques such as Thevenin's Theorem, current and voltage division, and Maximum Power Transfer Theorem, while understanding power dissipation and basic protection methods in electrical circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the basic concepts of electrical circuits including current, voltage, and circuit components. 2. Analyze DC circuits using Ohm's Law and Kirchhoff's Laws. 3. Evaluate AC signals by calculating average and RMS values and understanding sinusoidal steady-state behavior. 4. Describe the operation of capacitors and inductors as energy storage elements in AC circuits. 5. Analyze RL, RC, and RLC circuits in time and frequency domains including resonance and frequency response. 6. Apply circuit theorems such as Thevenin's Theorem and Maximum Power Transfer Theorem to evaluate circuit performance and power dissipation.

Indicative Contents المحتويات الإرشادية	1. **DC Circuits**: Fundamental definitions of current and voltage, the passive sign convention, and basic circuit components. Methods for combining resistors in series and parallel configurations. Application of Kirchhoff's Laws and Ohm's Law in circuit analysis. Structure of electrical circuits and techniques for network reduction. **[15 hours]** 2. **AC Circuits I**: Analysis of time-varying signals, including calculation of average and RMS values. Introduction to capacitors and inductors as energy-storing components, and basic steady-state sinusoidal analysis in AC circuits. **[20 hours]** 3. **AC Circuits II:** Study of RL, RC, and RLC circuits, including the frequency response of RLC networks. Basic filter circuits such as band-pass filters, resonance behavior, and the quality factor (Q-factor). Use of Bode plots for frequency analysis, along with differential equations to determine circuit behavior. Examination of time responses, including natural and step responses, and an introduction to second-order circuits. **[20 hours]** 4. Analysis of resistive networks using voltage and current sources, including application of Thevenin's Theorem, current and voltage division, and evaluation of input and output resistance. The topic also introduces the Maximum Power Transfer Theorem, RMS values, power dissipation, and basic protection methods such as current limiting and over-voltage protection. **[20 hours]**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Present key concepts through structured explanations and visual aids. 2. Discussions: Encourage interaction and exchange of ideas to clarify concepts. 3. Practical activities: Apply theory through laboratory work, simulations, and exercises. 4. Questions and feedback: Provide opportunities for questions and immediate clarification.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #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	Resistance, conductance, effect of temp. on the resistance value
Week 2	Ohm's law, series connection, parallel connection, compound connection
Week 3	Voltage and current divider solved examples, Kirchhoff's laws
Week 4	Star-delta conversion examples
Week 5	Thevenin's theorem, maximum power transfer
Week 6	Nodal method, superposition
Week 7	Alternating voltage and current
Week 8	Frequency, period, instantaneous value of voltage and current

Week 9	Component of A.C circuit, pure resistance, pure inductance, pure capacitance
Week 10	Series A.C circuit, R,L,C in series
Week 11	Impedance, phase angle, resonance, phase diagram
Week 12	Parallel A.C circuit, R,L,C, Admittance, power factor
Week 13	Active, reactive, apparent power in A.C circuit
Week 14	3-phase circuit
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: DC Voltage and current Measurement
Week 2	Lab 2: Ohm's law.
Week 3	Lab 3: Power in DC Circuit
Week 4	Lab 4: Voltage and current divider rules
Week 5&6&7	Lab 5: Kirchhoff's laws
Week 8&9	Lab 6: Thevenin's Theorem
Week 10&11	Lab 7: Series RLC circuit
Week 12&13&14	Lab 8: Parallel RLC circuit
Week 15	**Testing and Evaluation**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Robert L. Boylestad, *Introductory Circuit Analysis*, 10th/11th/12th ed., Pearson Education, 2010–2019.	Yes
Recommended Texts	• Charles K. Alexander and Matthew N. O. Sadiku, *Fundamentals of Electric Circuits*, 5th or later ed., McGraw-Hill Education, 2013–2020.	No

	• William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin, *Engineering Circuit Analysis*, 8th or later ed., McGraw-Hill Education, 2012–2019.	
Websites	https://www.allaboutcircuits.com/textbook/direct-current/chpt-1/conductors-insulators-electron-flow/	

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.

	Ministry of Higher Education and Scientific Research - Iraq AL-Karkh University of Science Engineering Department of AI and Robotics	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Data Structure**		**Module Delivery**
Module Type	**B**		☒**Theory** ☐ **Lecture** ☒**Lab** ☐ **Tutorial** ☐ **Practical** ☐**Seminar**
Module Code	AIR12009		
ECTS Credits	6		
SWL (hr/sem)	**150**		
Module Level	1	**Semester of Delivery**	2
Administering Department	AI and Robotics	**College**	College of Engineering
Module Leader	Ahmed Adnan Hadi	**e-mail**	a.algbory@kus.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Ph.D
Module Tutor	Osama Mohammed Noori	**e-mail**	osama20111989@kus.edu.iq
Peer Reviewer Name	/	**e-mail**	/
Scientific Committee Approval Date		**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand the fundamental concepts of data structures and their role in organizing and managing data efficiently. 2. Analyze algorithm performance using basic complexity analysis and Big-O notation. 3. Understand and apply linear data structures such as arrays, linked lists, stacks, and queues. 4. Explain advanced list structures including doubly linked lists and circular linked lists. 5. Understand tree structures, particularly binary search trees, and perform basic tree operations and traversals. 6. Describe advanced data structures such as heaps and hash tables and explain their practical applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the fundamental concepts of data structures and their importance in computer science. 2. Analyze algorithm efficiency using basic time complexity concepts and Big-O notation. 3. Implement and manipulate linear data structures such as arrays, linked lists, stacks, and queues. 4. Distinguish between different linked list structures including singly, doubly, and circular linked lists. 5. Apply tree-based structures such as binary search trees and perform basic traversal operations. 6. Describe and use advanced data structures such as heaps and hash tables for efficient data management.

Indicative Contents المحتويات الإرشادية	1. Basic concepts of data structures, importance of data organization, and the relationship between algorithms and data structures. 2. Basic concepts of algorithm efficiency, time complexity, space complexity, and Big-O notation. 3. Structure of arrays, indexing, traversal, insertion, deletion, and searching operations. 4. Concept of linked lists, node structure, singly linked lists, and basic operations 5. Stack structure, push and pop operations, and practical applications. 6. Queue structure, enqueue and dequeue operations, and types of queues. 7. Doubly linked lists and circular linked lists and their applications. 8. Tree structure, terminology (root, parent, child, leaf), and hierarchical data representation. 9. BST properties, insertion, searching, deletion, and tree traversal methods. 10. Min-Heap and Max-Heap concepts and applications in priority queues. 11. Hash functions, collision handling techniques, and applications. 12. Graph concepts, types of graphs, and graph representation methods. **13.** Breadth-First Search (BFS) and Depth-First Search (DFS) algorithms and their applications.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures :The instructor explains the main concepts of the course using clear explanations, examples, and visual aids such as slides and diagrams. 2. Class Discussions :Students are encouraged to participate in discussions and share ideas to better understand the concepts. 3. Laboratory Activities :Students practice programming and implement data structures in the laboratory to apply what they learn in theory. 4. Questions and Feedback :Students are given opportunities to ask questions and receive immediate feedback from the instructor to clarify difficult topics.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #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	Introduction to Data Structures and Basic Concepts
Week 2	Algorithm Analysis and Big-O Notation
Week 3	Arrays: Structure, Operations, and Applications
Week 4	Linked Lists: Concept, Structure, and Basic Operations
Week 5	Stack Data Structure and its Applications
Week 6	Queue Data Structure and Types of Queues
Week 7	Advanced Linked Lists: Doubly Linked Lists and Circular Linked Lists
Week 8	Trees: Basic Concepts and Terminology

Week 9	Binary Search Trees (BST) and Tree Traversal Methods
Week 10	Heap Data Structure and Priority Queues
Week 11	Hash Tables and Hashing Techniques
Week 12	Graphs: Basic Concepts, Types of Graphs
Week 13	Graph Representation: Adjacency Matrix and Adjacency List
Week 14	Graph Traversal Algorithms: BFS and DFS
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to the lab environment and review of basic concepts used in data structures
Week 2	Writing simple programs to analyze algorithms and understand basic complexity concepts
Week 3	Implementing arrays and practicing operations such as insertion, deletion, and traversal
Week 4	Implementing singly linked lists and performing basic operations
Week ٥	Implementing stack using arrays or linked lists and testing push and pop operations
Week ٦	Implementing queue and practicing enqueue and dequeue operations
Week ٧	Implementing doubly linked lists and circular linked lists
Week ٨	Creating simple programs to represent and manipulate tree structures
Week ٩	Implementing binary search trees (BST) and practicing traversal methods
Week ١٠	Implementing heap data structure and understanding priority queue operations
Week ١١	Implementing hash tables and testing hashing functions
Week ١٢	Creating programs to represent graphs
Week ١٣	Implementing graph representation using adjacency matrix and adjacency list
Week ١٤	Implementing graph traversal algorithms (BFS and DFS) and testing them on sample graphs
Week ١٥	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Recommended Texts	• Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. Introduction to Algorithms. MIT Press. • Weiss, M. A. Data Structures and Algorithm Analysis in C++. Pearson Education.	No
Websites	https://www.pearson.com/en-us/subject-catalog/p/data-structures-and-algorithm-analysis-in-c	

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.

	Ministry of Higher Education and Scientific Research - Iraq AL-Karkh University of Science Engineering Department of AI and Robotics	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English language 1**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	KUS12011				
ECTS Credits	**2**				
SWL (hr/sem)	50				
Module Level	**1**		**Semester of Delivery**	2	
Administering Department	AI and Robotics		**College**	**College of engineering**	
Module Leader	Lina Lutfi Rasheed		**e-mail**	Eng.linalutfi@kus.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Master degree	
Module Tutor	Lina Lutfi Rasheed		**e-mail**	Eng.linalutfi@kus.edu.iq	
Peer Reviewer Name	/		**e-mail**	/	
Scientific Committee Approval Date	/		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop students' basic English language skills in reading, writing, listening, and speaking. 2. To improve students' grammar and vocabulary for academic and everyday communication. 3. To help students build confidence in speaking English in classroom discussions and presentations. 4. To enhance students' writing skills, including sentence structure, paragraph writing, and short compositions. 5. To introduce students to basic academic English needed for university study. 6. To encourage students to use English as a tool for communication and learning.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Use key English grammar structures such as present, past, and future forms in spoken and written communication. 2. Apply appropriate vocabulary and expressions related to everyday topics such as people, experiences, food, travel, and work. 3. Understand the main ideas and specific information in short to medium-length reading texts. 4. Listen to conversations and short talks and identify the general meaning and important details.
Indicative Contents المحتويات الإرشادية	1. Basic English communication skills, including introducing oneself, asking and answering questions, and participating in simple conversations in everyday situations**. (10 Hours)** 2. Study of essential grammar structures, such as present, past, and future tenses, modal verbs, comparative and superlative forms, and conditional sentences**. (10 Hours)** 3. Development of vocabulary related to everyday topics, including daily life, travel, food, work, hobbies, and relationships, to help learners communicate more effectively**. (10 Hours)** **4.** Practice of the four language skills: listening, speaking, reading, and writing through various classroom activities and exercises**. (10 Hours)** 5. Improvement of pronunciation and fluency through dialogues, listening tasks, and speaking practice**. (10 Hours)**

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
	1. Interactive Lectures: Presenting grammar, vocabulary, and language functions through explanations and guided practice. 2. Communicative Language Teaching: Encouraging students to use English actively through pair work, group discussions, and role-plays. 3. Task-Based Activities: Using tasks from the course book to practice real-life communication skills. 4. Listening and Reading Practice: Developing comprehension skills through audio materials and reading passages. 5. Writing Practice: Guiding students to produce sentences, paragraphs, and short texts using correct grammar and vocabulary. 6. Classroom Discussions: Encouraging students to express opinions, ask questions, and participate in conversations. 7. Use of Multimedia: Supporting learning through audio recordings, videos, and digital resources.

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to English Communication
Week 2	Present Tenses
Week 3	Past Tenses
Week 4	Vocabulary Development
Week 5	Quantities and Articles
Week 6	Talking about the Future
Week 7	Present Perfect
Week 8	Comparatives and Superlatives
Week 9	Modals and Advice
Week 10	Narrative and Storytelling
Week 11	Conditional Sentences
Week 12	Integrated Skills Practice
Week 13	Integrated Skills Practice
Week 14	Integrated Skills Practice
Week 15	Preparation for the final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Headway Pre-Intermediate Student's Book (5th Edition) – by Liz Soars, John Soars, and Paul Hancock. Published by Oxford University Press, 2018/2019. ISBN: 978-0194527699	yes
Recommended Texts		

Websites	Headway: Pre-intermediate Student's Book with Online Practice - Liz Soars, John Soars, Paul Hancock - كتب Google

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.

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	
(**5**) ساعة	• تهيئة العرض التقديمي (عرض تقديمي للطلاب)
(**7**) ساعة	• واجبات (حل وانجاز واجبات الطلبة)
(**5**) ساعة	• التهيئة للامتحان النهائي
(**17**) ساعة	المجموع

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسي ة					
Module Title	**اللغة العربية**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**KUS12010**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	**1**		**Semester of Delivery**		**1**
Administering Department	**AI & Robotics**		**College**	**Collage of Engineering**	
Module Leader	أ.م.د. مثنى محمد عبدالحسين		**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		**Ph.D**
Module Tutor			**e-mail**		
Peer Reviewer Name	**لا يوجد**		**e-mail**	**لا يوجد**	
Scientific Committee Approval Date			**Version Number**		**1.0**

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	ترتبط اللغة العربية وفروعها المتعددة مع الاختصاصات الأخرى بصلة جوهرية ، لان الفروع جميعها متعاونة لتحقيق الغرض الأصلي منها ، وهو تمكين المتعلم من استخدام اللغة استخداما صحيحا للأفهام والفهم	Semester	
Co-requisites module	لصلتها الأساسية في توجيه الطالب لكتابة التقارير والبحوث بلغة سليمة ومختصرة تؤدي الى انجاز بحوث هادفة ومكتملة المعنى	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسي ة	تقويم اللسان تهيئة الاذهان - اللفظ بشكل سليم تنمية مهارات صياغة الكتب والمخاطبات الرسمية - اعداد البحوث والتقارير بشكل سليم
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	مخرجات المعرفة العامة التي تتمثل (التعرف إلى مستويات نظام اللغة العربية - معرفة القواعد النحوية والصرفية - وصف المناهج النقدية والظواهر الأدبية - التعريف بأبرز المصنفات اللغوية والأدبية) بالإضافة الى المهارات الذهنية الإدراكية(- المهارات العملية أو المهنية - المهارات المنقولة/ العامة - مهارات الاتصال، وتقنية المعلومات -الاتجاهات والقيم والبعد الأخلاقي)
Indicative Contents المحتويات الإرشادية	تعد علاقة الإرشاد بالتربية علاقة تكامل، فلا يمكن التفكير بالتربية بدون الإرشاد وتعد المؤسسات التربوية المجال الحيوي الفعال للإرشاد، إذ أن هذه الاخيرة في أمس الحاجة إلى خدماته وذلك بسبب الفروقات الفردية ب زي الطلاب، اختلاف المناهج، ازدياد عدد الطلبة، ازدياد المشكلات الاجتماعية

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	أجهزة الصوت – شاشة العرض -اللاب توب -المنهج المقرر – أمثلة حية

Student Workload (SWL) الحمل الدراسى للطالب			
Structured SWL (h/sem) الحمل الدراسى المنتظم للطالب خلال الفصل		33 ساعة	
Unstructured SWL (h/sem) الحمل الدراسى غير المنتظم للطالب خلال الفصل		17 ساعة	

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50 ساعة

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	5	فهم الطالب لعدد من المحاضرات وكيفية الربط بينهم
	Assignments	1	5% (5)	3	اكتساب الطالب مهارة البحث وإيجاد المعلومة الدقيقة
	Projects / Lab.	1	10% (10)	لا يوجد	لا يوجد
	Report	1	10% (10)	10	تهيئة الطالب لإعدا د مشاريع تخرج بصورة صحيحة وبشكل مفصل وتعليمة عل كيفية استخدام المصاد ر
Summative assessment	Midterm Exam	2hr	20% (2)0	9	معرفة حصيلة فهم الطالب للماد ة

	Final Exam	2hr	60% (6)0	16	التقييم النهائي
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظر ي	
Week	Material Covered
Week 1	التعريف بمباد ئ اللغة العربية واهميتها وأقسامها وكيفية توظيفها في مجالات الحياة كافة
Week 2	التمييز بين همزة الوصل وهمزة القطع وكيفية ضبط النص املائيًا
Week 3	العدد والمعدود وأقسامه وتوظيفه عملياً
Week 4	علامات اليقيم وكيفية تنقيط النص للوصول إلى جمل مترابطة في سياقها
Week 5	الإيجاز في الإداء اللغوي وتكثيف المعنى
Week 6	محاضرة نحوية في الفاعل ونائبه
Week 7	الأغلاط اللغوية الشائعة وكيفية تصحيحها
Week 8	موازنة بين عصرين شعريين وأبرز شعرائه
Week 9	Midterm exam
Week 10	الأسس العلمية والمنهجية في كتابة التقارير بأنواعها وتوظيفها عمليًا
Week 11	كيفية تصحيح الكتب الرسمية وربط مضمون السياق النصي
Week 12	محاضرة في الأدب العربي وتسليط الضوء عل أقسامه وتفصيلاتها
Week 13	التوكيد وأنواعه واصول توظيفه نصيًا
Week 14	محاضرة نحوية في التقديم والتأخير
Week 15	دروس عملية في تطبيق القواعد النحوية والإملائية وتصحيح النصوص
Week 16	Second Midterm Exam

ز

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبو يع للمخت ي	
Week	**Material Covered**
Week 1	المادة نظرية بحت
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	اللغة العربية العامة لأقسام غ ي الاختصاص – عبد القادر حسن امين	نعم
Recommended Texts	رؤية في مناهج تدريس اللغة العربية – استاذ الدكتور سعد علي زاير + العربية الجامعية لغير المتخصصين – دكتور عبد الراجي	نعم
Websites	تم الاعتماد عل كتب من دون استخدام الانترنت	

Grading Scheme مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success Group (50 -)001	**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(	94(-45)	More work required but credit awarded
	F – Fail	راس ب	44(-0)	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.

	Ministry of Higher Education and Scientific Research - Iraq AL-Karkh University of Science Engineering Department of AI and Robotics	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Engineering Mathematics**			**Module Delivery**	
Module Type	**B**			☒**Theory** ☐**Lecture** ☐ **Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**AIR12008**				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	2	
Administering Department	AI & Robotics		**College**	Engineering	
Module Leader	Dr. Aws Khalid Ibrahim		**e-mail**	aws.khalid@kus.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D	
Module Tutor	Dr. Aws Khalid Ibrahim		**e-mail**	aws.khalid@kus.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1) Provide students with the essential mathematical foundations required for engineering studies. 2) Develop students' ability to manipulate algebraic, trigonometric, and logarithmic expressions used in engineering analysis. 3) Introduce fundamental concepts of matrices, vectors, and complex numbers and their applications in engineering problems. 4) Enable students to solve systems of linear equations using matrix methods. 5) Introduce students to partial differentiation and differential equations used in engineering modeling. 6) Familiarize students with Laplace transforms as a mathematical tool for solving differential equations. 7) Strengthen analytical thinking and problem-solving skills relevant to engineering, robotics, and intelligent systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1) Apply algebraic techniques and manipulate exponential and logarithmic functions in engineering problems. 2) Analyze and solve problems involving trigonometric and hyperbolic functions. 3) Decompose rational functions using partial fractions. 4) Perform operations with complex numbers and represent them in different forms. 5) Perform matrix operations and use matrices to solve systems of linear equations. 6) Determine determinants, inverses, eigenvalues, and eigenvectors of matrices. 7) Apply vector algebra including scalar and vector products in engineering applications. 8) Solve problems involving partial differentiation. 9) Solve first-order and second-order differential equations. 10) Apply Laplace transforms to basic engineering problems. 11) Use mathematical reasoning to model and analyze engineering systems.

Indicative Contents المحتويات الإرشادية	**1. Logarithmic, Trigonometric and Hyperbolic Function:** Exponential functions**,** Logarithmic functions**,** Trigonometric identities, Trigonometric equations, Hyperbolic functions and their properties **3. Partial Fractions and Complex Numbers:** Decomposition of rational functions, Applications in engineering mathematics**,** Algebraic form of complex numbers, Polar representation, Basic operations on complex numbers **5. Matrices and Vectors:** Matrix addition and subtraction**,** Matrix multiplication, Transpose of a matrix, Special matrices, Determinant of a square matrix, Inverse of a matrix, Solution of linear systems, Eigenvalues and eigenvectors**,** Components of vectors, Unit vectors, Vectors in space, Direction cosines, Scalar product, Vector product, Angle between two vectors **7. Differentiation and Laplace Transforms:** Partial derivatives, Applications in engineering problems, First-order differential equations, Second-order differential equations, Introduction to Laplace transforms, Basic Laplace transform techniques

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. **Lectures**: Presentation of theoretical concepts and mathematical foundations. 2. **Tutorial Sessions**: Step-by-step analytical solutions of representative examples. 3. **Interactive Learning** :Classroom discussions and student participation in solving problems. 4. **Practice Exercises** :Regular assignments to reinforce understanding of mathematical concepts. 5. **Visual and Graphical Illustrations** :Use of diagrams, graphs, and mathematical visualization to explain concepts. 6. **Application-Based Learning**: Demonstrating engineering applications related to robotics, artificial intelligence, and engineering systems. 7. **Review Sessions**: Periodic revision of key topics and preparation for examinations.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	1	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #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	Algebra review, exponential and logarithmic functions
Week 2	Trigonometric and Hyperbolic Functions
Week 3	Partial fractions
Week 4	Complex numbers
Week 5	Matrices: Addition, Subtraction, Multiplication, Transpose, and special matrices
Week 6	Matrices: Determinant and Inverse of a Square Matrix
Week 7	Matrices: Solution of Linear Equations
Week 8	Matrices: Eigenvalues and Eigenvectors
Week 9	Vectors: Component of a Vector, Unit Vectors, Vectors in Space, and Direction Cosines.
Week 10	Vectors: Scalar Product, Vector Product, and Angle between Two Vectors.
Week 11	Partial Differentiation
Week 12	First-Order Differential Equations
	Second-Order Differential Equations

Week 13	
Week 14	Introduction to Laplace Transforms
Week 15	**Review and Final Exam Preparation** • Comprehensive course review and revision.

Delivery Plan (Weekly Tutorial Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Tutorial in exponential and logarithmic functions
Week 2	Problems in Trigonometric and Hyperbolic Functions
Week 3	Tutorial in Partial fractions
Week 4	Tutorial in Complex numbers
Week 5	Problems in Matrices (Addition, Subtraction, Multiplication, Transpose, and special matrices)
Week 6	Tutorial in Matrices (Determinant and Inverse of a Square Matrix)
Week 7	Problems in Matrices (Solution of Linear Equations)
Week 8	Tutorial in Matrices (Eigenvalues and Eigenvectors)
Week 9	Tutorial in Vectors (Component of a Vector, Unit Vectors, Vectors in Space, and Direction Cosines)
Week 10	Problems in Vectors (Scalar Product, Vector Product, and Angle between Two Vectors)
Week 11	Tutorial in Partial Differentiation
Week 12	Tutorial in First-Order Differential Equations
Week 13	Tutorial in Second-Order Differential Equations
Week 14	Problems in Laplace Transforms
Week 15	**Review and Final Exam Preparation** • Comprehensive course review and revision.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Mathematics by K.A. Stroud, 7th edition.	yes
Recommended Texts	1. Advanced Engineering Mathematics – Erwin Kreyszig, 10th edition. 2. Linear Algebra and Its Applications – Gilbert Strang, 4th edition.	No
Websites	https://www.mathforengineers.com/	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Workshops**			**Module Delivery**	
Module Type	S			☐**Theory** ☐ **Lecture** ☐**Lab** ☐ **Tutorial** ☒**Practical** ☐ **Seminar**	
Module Code	AIR12013				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		1	**Semester of Delivery**		2
Administering Department		AI & Robotics	**College**	College of Eng.	
Module Leader	Layth Majid Jalil		**e-mail**	laythmajid@kus.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M.Sc
Module Tutor	Layth Majid Jalil		**e-mail**	laythmajid@kus.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Provide students with the fundamental technical knowledge and skills in workshop to recognize, analyze and solve problems, and to apply these abilities to the generation of new knowledge, ideas or products in industry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Explain the use of measuring and bench fitting tools. • Show the use of safety equipment during workshop practice. • Knowledge and understanding the use of different tools. • Describe the basic concepts of different types of welding. • Display the ability to use different basic machining operations keeping all • safety precautions in mind.
Indicative Contents المحتويات الإرشادية	

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدرا يس المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدرا يس المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدرا يس غ ري المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدرا يس غ ري المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدرا يس الك يل للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (5)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	11	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	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	Principles of safety in workshop and laboratories
Week 2	Machining process
Week 3	Machining process
Week 4	Sheet metal forming
Week 5	Sheet metal forming
Week 6	Welding process
Week 7	Welding process
Week 8	Mid 1 Examine
Week 9	Electricity
Week 10	Electricity
Week 11	Machining process
Week 12	Machining process
Week 13	Carpentry
Week 14	Carpentry
Week 15	Mid 2 Examine
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts		
Websites		

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Chemistry			**Module Delivery**	
Module Type	**Basic**			☐**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practica l** ☐**Seminar**	
Module Code	AIR12012				
ECTS Credits	**4**				
SWL (hr/sem)	100				
Module Level	1		**Semester of Delivery**	2	
Administering Department	AI & Robotics		**College**	Engineering	
Module Leader	Fadhil Muhi Mohammed		**e-mail**	fadhil.mohammed@kus.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide students with a solid foundation in fundamental chemistry concepts. 2. To develop understanding of atomic structure, chemical bonding, and molecular interactions. 3. To teach quantitative chemical analysis and stoichiometry for practical problem solving. 4. To introduce thermodynamics and kinetics to explain chemical behavior. 5. To explain acid-base chemistry, solutions, and electrochemistry. 6. To provide an introduction to organic chemistry and materials relevant to engineering applications. 7. To link chemistry principles to materials, sensors, and electronic devices for AI & Robotics applications. 8. To develop practical problem-solving skills and analytical thinking in chemistry contexts.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain atomic structure, periodic trends, and chemical bonding. 2. Predict molecular geometry and intermolecular interactions. 3. Perform stoichiometric calculations and solve quantitative chemical problems. 4. Apply thermodynamics and kinetics concepts to explain chemical reactions. 5. Analyze acid-base equilibria, pH, and solution chemistry problems. 6. Explain redox reactions and basic electrochemical concepts. 7. Describe basic organic compounds and functional groups relevant to engineering materials. 8. Understand polymers, corrosion, and material chemistry. 9. Understand sensor materials, batteries, and electronic chemistry. 10. Demonstrate problem-solving skills and apply chemistry concepts to real-world engineering contexts.
Indicative Contents المحتويات الإرشادية	Foundations of Chemistry This section introduces students to basic chemistry concepts including measurement units, the scientific method, and laboratory safety. Atomic structure, isotopes, and electronic configuration are explained, followed by an overview of the periodic table and periodic trends. These fundamentals are essential for understanding subsequent chemical behavior. [6 hrs] Chemical Bonding and Molecular Structure Students study ionic, covalent, and metallic bonds, along with Lewis structures and formal charges. Molecular geometry, VSEPR theory, and intermolecular forces are discussed to explain physical and chemical properties of substances. Special emphasis is placed on bonds and interactions relevant to engineering materials. [8 hrs]

	Stoichiometry and Chemical Calculations Topics include the mole concept, balancing chemical equations, limiting reactants, and yield calculations. Practical problem-solving exercises prepare students for analyzing real-world chemical reactions and materials processing. [6 hrs] Thermodynamics and Kinetics This section covers energy changes in chemical reactions, enthalpy, entropy, Gibbs free energy, reaction rates, and factors affecting reaction kinetics. Students learn how these principles govern material stability and reaction feasibility in engineering applications. [8 hrs] Acids, Bases, and Solutions Students explore the Brønsted-Lowry and Lewis definitions, pH calculations, buffer solutions, and solubility equilibria. Applications include concrete chemistry for Civil Engineering and electrolyte solutions for AI & Robotics devices. [6 hrs] Electrochemistry and Redox Reactions This section introduces oxidation-reduction reactions, electrochemical cells, standard potentials, and Faraday's laws. Applications include corrosion prevention, batteries, and sensor materials. [6 hrs] Organic Chemistry and Functional Materials Basic organic chemistry is introduced, including hydrocarbons, alcohols, and functional groups. Emphasis is on polymers, composites, and electronic materials relevant to Civil Engineering and AI & Robotics. [8 hrs] Material Chemistry in Engineering Applications This section focuses on topics include sensor materials, batteries, semiconductors, and polymeric devices. Interdisciplinary examples illustrate the connection between chemistry principles and engineering design For AI & Robotics,. [10 hrs] Revision and Problem-Solving Students consolidate knowledge across all topics through exercises and real-world engineering problems. The session emphasizes practical application, critical thinking, and interdisciplinary connections. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage

	students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and by considering types of simple experiments involving some interesting for example sampling activities for the students. As well as by assigning students to make seminars on a specific topic in chemistry.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered

Week 1	Introduction to Chemistry: Basic Concepts and Measurements
Week 2	Atomic Structure and the Periodic Table
Week 3	Chemical Bonding: Ionic, Covalent, and Metallic Bonds
Week 4	Molecular Geometry and Intermolecular Forces
Week 5	Stoichiometry and Chemical Calculations
Week 6	Chemical Thermodynamics: Energy, Enthalpy, and Entropy
Week 7	Chemical Kinetics and Reaction Rates
Week 8	Acids, Bases, and pH Concepts
Week 9	Solutions, Concentrations, and Solubility
Week 10	Oxidation-Reduction Reactions and Electrochemistry
Week 11	Organic Chemistry Basics: Hydrocarbons and Functional Groups
Week 12	States of matter
Week 13	Material chemistry
Week 14	Green chemistry and sustainability
Week 15	**Buffer solution**
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Laboratory safety and introduction to laboratory techniques and measuremnts
Week 2	Preparation of standard solutions from solid materials
Week 3	Preparation of standard solution from liquid reagents
Week 4	Titration strong acid with a strong base
Week 5	Titration of Sodium Carbonate with Hydrochloric Acid
Week 6	pH-metric titration
Week 7	Conductometric Titration of a Strong Acid with a Strong Base
Week 8	Conductivity measurement of electrolyte solutions

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Principles of Inorganic Chemistry, 2nd Edition** Brian W. Pfennig December 2021 Principles of Organic Chemistry 1st Edition - January 27, 2015	No
Recommended Texts	Principles of Instrumental Analysis, 7E by Douglas A. Skoog/F. James Holler/Stanley R. Crouch , 2020 Chemical Priciples, The Quest for KInsight, Third Edition, by Peter Atkins and Lorestta Jones, 2005	No
Websites	https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science.	

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.