MECHANICAL ENGINEERING

MODULE DESCRIPTION FORM

LEVEL UGI

SEMESTER 1 and 2

SEMESTER 1	
ME101	Engineering Mechanics-Statics I
ME102	Mathematics I
ME103	Manufacturing Processes I
ME104	Engineering Drawing
ME105	Physics 1
UOM1031	Computer 1
UOM1011	Arabic Language1
SEMESTER 2	
ME151	Engineering Mechanics-Statics II
ME152	Mathematics II
ME153	Physics 2
ME154	Introduction to Electrical Engineering
ME155	Energy and Sustainability
UOM1021	English language I
UOM1040	Democracy and Human Rights

LEVEL UGI
SEMESTER 1

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Engineering Mechanics-Statics 1**			**Module Delivery**	
Module Type	**C**			☒ **Theory**	
Module Code	**ME101**			☒ **Lecture**	
ECTS Credits	**4**			☐ **Lab**	
SWL (hr/sem)	**100**			☒ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	UGI	**Semester of Delivery**	1		
Administering Department	ME	**College**	COE		
Module Leader	Omar Jumaah	**e-mail**	omarjumaah@uomosul.edu.iq		
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.		
Module Tutor		**e-mail**			
Peer Reviewer Name	None	**e-mail**			
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0		

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

Module Aims, Learning Outcomes, and Indicative Contents	
Module Aims	1. To develop the capacity of first-level students to predict the effects of forces, moments, and couples on bodies. 2. To develop problem-solving skills and an understanding of forces analysis by applying the equilibrium principle.

	3. To understand and draw the free body diagram to analyze forces. 4. Analysis forces and finding their resultant forces for two- and three-dimensional systems. 5. Applying the equilibrium principle to simple trusses and frames. 6. Understand the friction phenomena and the friction force in machine parts. 7. To understand the centroid and center of gravity for an area and a rigid body.
Module Learning Outcomes	1. The course offers basic knowledge of the physical and mathematical principles of mechanics. 2. Analyze and calculate resultant forces that are applied to bodies in equilibrium conditions. 3. Recognize forces, free body diagram approach to solve problems. 4. Explain the essential steps of drawing free-body diagrams for different mechanical structures. 5. Discuss the effect of reaction and normal forces on bodies. 6. Describe the approaches to finding resultant forces analytically and graphically. 7. Identify the vector operations for normal forces and resultant moments, and couples. 8. Analyze equilibrium systems that include frictional forces. 9. Locate the centroid of composite bodies and calculate the moment of inertia for a given body and axes.
Indicative Contents	Indicative content includes the following. <u>Part A - General Principles</u> **Basic Quantities, including**: - Fundamental Concepts of Length, Time, Mass, and Force. - The applied force is entirely characterized by its magnitude, direction, and point of application. [10 hrs] **Modeling of mechanical systems** - Newton's Three Laws of Motion. - Behaviors of particle and rigid body under applying load. - The Free-Body Diagram. [15 hrs] **Force Vectors** - Defintion of scalar and vector. - Scalars and Vectors operation - Force Vector Directed Along a Line [15 hrs] <u>Part B – Principle of Equilibrium and Force System Resultants</u> - Free-Body Diagrams - Equilibrium of a particle - Condition for the equilibrium. - Categories of the equilibrium - Distributed loadings. [35 hrs] **Force System Resultants**

	- Moment of a force— Scalar Formulation - Moment of a force—Vector Formulation - Principle of transmissibility and equivalent system. - Simplification of a force and couple system [10 hrs] - Two- and Three-Force Members. [25 hrs] **Structural Analysis** - Simple Trusses. - The Method of Joints. - Zero-Force Members. - The Method of Sections. - Frames and Machines. [15 hrs] Part C– Principle of Centriod and Moment of Inertia. - Center of gravity, the center of mass and centroid of a body - Centriod of composite area. - Definition of moments of inertia for areas, the radius of gyration - Moment of inertia of composite area. [45 hrs] Part D– Principle of Friction. - Types of Friction - Characteristics of Dry Friction. - Flexible Belts. [25 hrs]

Learning and Teaching Strategies	
Strategies	This course aims to develop the capacity of first-year students to predict the effects of forces, moments, couples, and the distributed loads that are applied to bodies. Thus, the primary strategy of this curse is to encourage students' participation in discussions and to solve the exercises. Also, refining and expanding their critical thinking skills to analyze and study the effect of applied forces on bodies. This strategy is achieved through classes, interactive tutorials, and by considering real applications that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	100		

Module Evaluation

		Time/No	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	4, 8,13	LO # 2, 5 ,7,8 and 9
	Assignments	3	15% (15)	2, 6,12	LO # 2,3, 4, 6 ,7,and 9
	Projects / Lab.		0% (0)		
	Report		0% (0)		
Summative assessment	**Midterm Exam**	1 hr	20% (20)	9	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to statics + Vector operations (addition, product)
Week 2	Cartesian force and position vectors.
Week 3	Force system in 2D
Week 4	Addition of a system of coplanar Forces
Week 5	Moment, couples, and resultant of forces (1)
Week 6	Moment, couples, and resultant of forces (2)
Week 7	Equations and conditions of Equilibrium
Week 8	System Isolation and the Free-Body Diagram (FBD)
Week 9	Trusses: Method of Joints + Method of Sections
Week 10	Frames and Machines
Week 11	Center of Gravity and Centroid
Week 12	Moment of Inertia
Week 13	Moments of Inertia for Composite Areas
Week 14	Theory of Dry Friction.
Week 15	Applications of Friction in Machines
Week 16	**The final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Meriam, James L., and L. Glenn Kraige, "Engineering mechanics: statics", John Wiley & Sons, 2012.	Yes
Recommended Texts	Hibbeler, RC, "Engineering Mechanics Statics", 14th edition, 2016.	No
Websites		

Grading Scheme				
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 is required, but credit awarded
	F – Fail	راسب	(0-44)	A considerable amount of work required

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics I**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME102**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	ME		**College**	COE	
Module Leader	Dr. Omer S. Alabidalkreem		**e-mail**	Omerphd18@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 8. Write clear mathematical arguments including effective use of physical equations. 9. Develop a solid understanding of the fundamental principles of physics, including: a. a firm conceptual grasp of the central principles of physics, b. an ability to work with the concepts mathematically, and c. a functional understanding of how these ideas play out in the real world. 10. Use graphs and diagrams to convey results. 11. Decide on strategies to be used and assumptions that need to be made. 12. Use both algebraic and geometric approaches in problem-solving. 13. Develop a flexible and creative problem-solving ability. 14. Develop an integrated understanding of the unity of mathematics. 15. Translate physical descriptions into mathematical equations, and conversely, explain the physical meaning of mathematical results. 16. Examine intermediate results or other quantities that could be used to ensure a solution is physically reasonable. 17. Develop their ability to communicate ideas of science.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand Algebraic, Non - Algebraic functions and its inverse. 2. Explain the limits, Continuity, Derivation of equations. 3. Understand the fundamentals of Application of derivation. 4. Understand the Vectors, Vectors product, Line and plane equation, Curvature, Tangent and normal vectors. 5. Explain the application and determination of Matrices. 6. Simultaneous linear algebraic equations, Cramer method, Matrix inversion method.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Function and graph, including:** [10 hrs] - Domain and Range, algebraic function, and trigonometric function. - Equation of straight line (examples and solved problems). **Limits:** [10 hrs] - Limit of algebraic function. - Limit of trigonometric function, rules of limit and examples. **Derivative:** [20 hrs] - Definition of derivative. - Differentiation of algebraic function. - Differentiation of trigonometric function. - Examples and solves problems. **Applications of Derivative:** [20 hrs] - Related rate, maximum and minimum theory. - Solved Problem.

	Inverse Trigonometric Function: [15 hrs] - Graph of inverse trigonometric function. - Derivative of inverse trigonometric function. - Solved problems. **Chain rule and parametric equation:** [10 hrs] - Algebraic, trigonometric, and inverse function. **Vectors:** [20 hrs] - Principles, vectors in two dimensions, vector in space, properties of vectors (dot and cross), and application on vectors. **Matrices:** [20 hrs] - Properties, types, multiplications, inverse matrix application.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	3	10% (10)	4, 9, 12	LO #1, 2, 8 and 10
	Assignments	4	10% (10)	2,6,10, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-6
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Domain and Range, algebraic function, and trigonometric function.
Week 2	Equation of straight line (examples and solved problems).
Week 3	Limit of algebraic function.
Week 4	Limit of trigonometric function, rules of limit and examples.
Week 5	Definition of derivative, Differentiation of algebraic function.
Week 6	Differentiation of trigonometric function.
Week 7	Examples and solves problems.
Week 8	Related rate, maximum and minimum theory.
Week 9	Solved problems.
Week 10	Graph of inverse trigonometric function, Derivative of inverse trigonometric function. Solved problems
Week 11	Algebraic, trigonometric, and inverse function.
Week 12	Principles, vectors in two dimensions, vector in space, properties of vectors (dot and cross), and application on vectors.
Week 13	Solved Problems.
Week 14	Properties, types, multiplications, inverse matrix application.
Week 15	Solved Problems.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus and Analytic Geometry by George B. Thomas, any	No

	edition.	
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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Manufacturing Processes I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME103**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		ME	**College**	COE	
Module Leader	Mohammed Najeeb Abdullah		**e-mail**	moh_77@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		12/06/2023	**Version Number**	1.0	

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

Module Aims, Learning Outcomes, and Indicative Contents	
Module Aims	1- To be aware of safety considerations and sustainable practices in manufacturing operations 2- To recognize the significance of manufacturing processes in the production of products. 2- To understand the role of manufacturing processes in converting raw materials into

	finished products. 3- To learn about the influence of engineering materials properties on manufacturing processes. 4- To explore factors affecting material selection and the impact of material properties on process outcomes. 5- To understand the principles, equipment, and procedures involved in the casting process. 6- To gain knowledge of machine tools, cutting tools, process parameters, and the application of machining processes. 7- To explore various joining processes used to combine different components and materials. 8- To learn about the equipment, tooling, and techniques involved in material removal processes. 9- To analyze manufacturing requirements, select appropriate processes, and comprehend the interactions between materials, processes, and product design.
Module Learning Outcomes	**Upon successful completion of this course, students will be able to:** 1. Understanding different manufacturing processes, their principles, and their applications in various industries. 2. Explain the importance of material properties and selection in manufacturing processes. 3. Apply the principles and techniques of casting processes. 4. Employ machining processes to produce precise and accurate components using appropriate cutting tools, machine tools, and process parameters. 5. Evaluate joining processes such as welding and select the most suitable process for joining different materials and components. 6. Apply material removal processes to remove material and achieve desired shapes, dimensions, and surface finishes. 7. Analyze manufacturing requirements and select appropriate processes based on product design, material properties, cost considerations, and quality requirements.
Indicative Contents	Indicative content includes the following. **<u>Part A – Introduction to Manufacturing Processes:[5 hrs]</u>** - Overview of manufacturing and its importance in engineering - Classification of manufacturing processes - Introduction to material properties and selection **Casting Processes:** [5 hrs] - Principles and types of casting processes - Sand casting: techniques and applications **Casting Processes (continued):** [10 hrs] - Investment casting: techniques and applications - Die casting: techniques and applications **Joining Processes:** [10 hrs] - Principles of joining processes - Welding: techniques and applications **<u>Part B – Machining Processes [20 hrs]</u>** - Introduction to machining processes

	- Turning: techniques and applications - Milling: techniques and applications - Drilling: techniques and applications - Grinding: techniques and applications **Material Removal Processes:** [10 hrs] - Theory of chip formation. - Forces in metal cutting. - Power and energy relations in cutting operations **Tool Geometry:** [10 hrs] - Material of cutting tools. - Tool failure and Wear - Tool Life - Economics of Metal Cutting,

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be encouraging students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, lab experiments, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	5.2
Unstructured SWL (h/sem)	57	**Unstructured SWL (h/w)**	4.8
Total SWL (h/sem)	150		

Module Evaluation

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Engineering materials, Physical and Mechanical Properties, Industrial Safety
Week 2	Metrology, Measuring Tools, Sources of Error in measurement
Week 3	Production of metals (ferrous & non-ferrous) (1)
Week 4	Production of metals (ferrous & non-ferrous) (2)
Week 5	Primary manufacturing processes - casting, furnaces
Week 6	Secondary manufacturing Processes - Welding (Arc and Oxy- acetylene), Joining.
Week 7	Machining Processes, introduction, types of cutting operations (1)
Week 8	Machining Processes, introduction, types of cutting operations (2)
Week 9	Theory of chip formation.
Week 10	Forces in metal cutting.
Week 11	Power and energy relations in cutting operations
Week 12	Turning and related operations, Milling operations
Week 13	Drilling and Grinding Operations
Week 14	Tool Geometry. Material of cutting tools.
Week 15	Tool failure and Wear, Tool Life, Economics of Metal Cutting,
Week 16	**The Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Introduction to Manufacturing Processes I Lab Safety Guidelines and Equipment Familiarization
Week 2	Lab: Introduction to Casting Processes Demonstration and Hands-on Practice of Sand Casting
Week 3	Lab: Casting Processes Continued Demonstration and Hands-on Practice of Die Casting
Week 4	Lab: Machining Processes Demonstration and Hands-on Practice of Turning (1)
Week 5	Lab: Machining Processes Demonstration and Hands-on Practice of Turning (2)
Week 6	Lab: Machining Processes Continued Demonstration and Hands-on Practice of Milling (1)
Week 7	Lab: Machining Processes Continued Demonstration and Hands-on Practice of Milling (2)
Week 8	Lab: Machining Processes Continued Demonstration and Hands-on Practice of Drilling
Week 9	Lab: Machining Processes Continued Demonstration and Hands-on Practice of Grinding

Week 10	Lab: Machining Processes Continued Demonstration and Hands-on Practice of Shaping (1)
Week 11	Lab: Machining Processes Continued Demonstration and Hands-on Practice of Shaping (2)
Week 12	Lab: Joining Processes Demonstration and Hands-on Practice of Welding (1)
Week 13	Lab: Joining Processes Demonstration and Hands-on Practice of Welding (2)
Week 14	Lab: Measuring devices Demonstration and Hands-on Practice of Measuring Devices (**1**)
Week 15	Lab: Measuring devices Demonstration and Hands-on Practice of Measuring Devices (**1**)

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Manufacturing methods and processes, Ahmed Al-Khatib and Khaled Ayoub, Mosul University / Dar Al-Kutub for printing and publishing, 1981.	yes
Recommended Texts	- Mediator in Production Engineering, d. Hussein Rajab Al-Sayed, University Rateb House, Beirut, 1984 - Principles of production processes, Qahtan Khalaf Khazraji, Adel Mahmoud Hassan, second edition, 1987	No
Websites		

Grading Scheme

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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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MODULE DESCRIPTION FORM

Module Information					
Module Title	**Engineering Drawing**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME104**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		ME	**College**	COE	
Module Leader	Nooraldeen Saleh Khidier		**e-mail**	**nooralelln2017@uomosul.edu.iq**	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Emad Hazim Kasim		**e-mail**	**emad.al_hajar@uomosul.edu.iq**	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		12/06/2023	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	Students will be able to: 18. Students will be able to: 19. 1. Drawing engineering shapes manually and clearly, including the effective use of the computer-aided drawing program (AutoCAD). 20. 2. Develop a solid understanding of the basic principles of engineering drawing, Included: a. Solid conceptual understanding of the central principles of engineering drawing, b. The ability to work with concepts, analytically, and visualize them c. A functional understanding of how these ideas will manifest in the real world. 21. Use the graphic results of a specific design and convert them into engineering drawings. 22. Determine the strategies to be used and the assumptions to be made. 23. Use both manual and computer approaches in drawing figures. 24. Develop the ability to use engineering tools flexibly and creatively. 25. Develop an integrated understanding of the AutoCAD module. 26. Developing their ability to communicate scientific ideas. 27. Identify what they do not understand, and ask specific questions to gain understanding. 28. Develop expertise in experimental methodologies.
Module Learning Outcomes	7. Understand and apply the basics of drawing types of lines. 8. Define, explain and apply engineering drawing operations. 9. Understand the basics of drawing an ogee curves 10. Understand and apply the basic idea of central projection theory. Apply the principle of conservation of mechanical energy to solve simple problems in mechanics. 11. Explanation of the central and parallel projection theory to understand the projection process. 12. Explain what different reference planes are .Horizontal Plane (HP), Vertical Frontal Plane (VP) Side Or Profile Plane (PP) 13. Explain Different Views are Front View (FV), Top View (TV) and Side View (SV) FV is a view projected on VP. TV is a view projected on HP. SV is a view projected on PP. 14. Drawing the side View by using the Auxiliary planes 15. Explanation of parallel projection methods The method of projection in the first quadrant, and the method of projection in

	the third quadrant. 16. Adopting the projection method in the third quarter to draw engineering projections. 17. Understanding the interrelationship of the three projections (F.V, S.V, & T.V). 18. Drawing a triangular solid of geometric shapes using the method of interconnecting its three projections. 19. Deduce the missing projection after drawing the triangular geometry. 20. Drawing cuts in the triangular shape using a FULL SECTION), using two levels (HALF SECTION), using multiple levels (OFFSET SECTION)
Indicative Contents	**Indicative content includes the following:-** **Introduction to engineering drawing and its tools , Point**[25 hrs] - Introduction and introducing students to the subject of engineering drawing, which includes the following: --Identification of engineering tools and how to use them. - Types of pens used in drawing geometric shapes. - Billboard layout and address field numbers. - How to deal with the engineering board and the engineering Painting. **The types of line and its properties , Line :** [25 hrs] - State, explain, and apply Newton's three laws of motion. - Differentiate between static and kinetic friction, and solve friction problems. - State and apply Hooke's law for ideal springs. **Engineering shapes and the arcs , lamina. , Dimensions:** [25hrs] - Various engineering operations: - - Introducing the drawing scale and its types: civil, mechanical, zoom-in, and zoom-out scale. - Teach students how to apply and draw the following engineering operations: - Drawing a straight line parallel to a known straight line - The division of the rectum into two halves - Angle division is known. - Drawing a straight line parallel to a known straight line from a point that does not belong to the known straight line. - Draw a tangent to a circle from a point that does not belong to it. - Draw a tangent to two contiguous circles from the outside. - Draw a tangent to two contiguous circles from the inside - Draw a tangent to one circle from the inside and the other from the outside. - Draw a tangent to a circle passing through a straight line - Draw an ogee curves - - **Multi view projection** [25 hrs] - Perpendicular Projection Theory of Objects: - Types of projection in drawing and its practical importance - projections with vertical rays - Types of projections resulting from vertical projection and approved in the projection of various engineering objects - Frontal view - Side view. - Top view - **Isometric drawing** [25 hrs]

	- Types of three-dimensional figures and their practical benefits Isometric - Drawing axes of measurement and how to put dimensions on them Linking the given projections with the process of imagining and drawing - **The section in Isometric** [25 hrs] - FULL SECTION - HALF SECTION - OFFSET SECTION - **Drawing the third Missing View:** [25 hrs] - How to deduce the Missing View from two known Views of the body - Draw the Missing View of objects with inclined surfaces

Learning and Teaching Strategies

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	93	**Structured SWL (h/w)**	5.2
Unstructured SWL (h/sem)	57	**Unstructured SWL (h/w)**	6.4
Total SWL (h/sem)	150		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	2, 5, 9,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	2, 5, 9,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative	**Midterm Exam**	3hr	20% (20)	10	LO # 1-4

assessment	**Final Exam**	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**Introduction to engineering drawing and its tools , Point** Introduction and introducing students to the subject of engineering drawing, which includes the following: --Identification of engineering tools and how to use them. • Types of pens used in drawing geometric shapes. • Billboard layout and address field numbers. • How to deal with the engineering board and the engineering Painting
Week 2	**The types of line and its properties , Line** Types of lines in engineering drawing: ---- Visible lines, hidden lines, center lines, dimension lines, cutting lines. • Draw an applied painting on the subject
Week 3	**Engineering shapes and the arcs , lamina. , Dimensions** Various engineering operations: - • Introducing the drawing scale and its types: civil, mechanical, zoom-in, and zoom-out scale. Teach students how to apply and draw the following engineering operations: Drawing a straight line parallel to a known straight line
Week 4	**Engineering shapes and the arcs , lamina. , Dimensions** Various engineering operations: - The division of the rectum into two halves . Angle division is known. . Drawing a straight line parallel to a known straight line from a point that does not belong to the known straight line. Draw a tangent to a circle from a point that does not belong to it.
Week 5	**Engineering shapes and the arcs , lamina. , Dimensions** Various engineering processes:- . Draw a tangent to two contiguous circles from the outside. . Draw a tangent to two contiguous circles from the inside . Draw a tangent to one circle from the inside and the other from the outside. .Draw a tangent to a circle passing through a straight line .Draw an ogee curves
Week 6 **Week 7** **Week 8** **Week 9**	**Multi view projection** Perpendicular Projection Theory of Objects: • Types of projection in drawing and its practical importance • projections with vertical rays • Types of projections resulting from vertical projection and approved in the projection of various engineering objects • Frontal view • Side view. • Top view

Week 10	**Isometric drawing** • Types of three-dimensional figures and their practical benefits Isometric • Drawing axes of measurement and how to put dimensions on them • Linking the given projections with the process of imagining and drawing
Week 11	
Week 12	
Week 13	**The section in Isometric** • FULL SECTION • HALF SECTION • OFFSET SECTION
Week 14	**Drawing the third Missing View of the body:** • How to deduce the Missing View from two known Views of the body • Draw the Missing View of objects with inclined surfaces
Week 15	
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	The application of each part of the covered drawing subject theoretically and according to the weekly sequence of the curriculum in the AutoCAD laboratory **Note: By two hours a week**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	➢ "NGINEERING DRAWING AND GRAPHIC TECHNOLOGY", Thirteen Edition, By: THOMAS E.FRENCH, CHARLES .VIERCK, ROBERT J.FOSTER ➢ ENGINEERING DRAWING AND AUTO CAD", By:RAMZY SYHOOD HAMIED ➢ TECHNICAL GRAPHICS COMMUNCATION", THIRD EDITION, Gary R.	No
Recommended Texts	➢ William D.CallisterJr.&David D.Rethwisch.(2010)"Material Science and Engineering An introduction", eightEdition. ➢ D. R. Askeland (2011) "The Scinence and engineering of materials". Course Outcomes	No
Websites	ENGINEERING DRAWING Any edition	

Grading Scheme				
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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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 I**			**Module Delivery**	
Module Type	**Base**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME105**				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		1	**Semester of Delivery**		1
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	**LECTURER SUHA HASHIM AHMED**		**e-mail**	suabaumu@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		MSC
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		09/11/2025	**Version Number**		1.0

Relation with other Modules العالقة مع المواد الدراسية ألخرى			
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	Students will be able to: 1. Write clear physical and mathematical arguments including effective use of physical equations. 2. Develop a solid understanding of the fundamental principles of physics, including: a. a firm conceptual grasp of the central principles of physics, b. an ability to work with the concepts mathematically, and c. a functional understanding of how these ideas play out in the real world. 3. Use graphs and diagrams to convey results. 4. Decide on strategies to be used and assumptions that need to be made. 5. Use both algebraic and geometric approaches in problem-solving. 6. Develop a flexible and creative problem-solving ability. 7. Develop an integrated understanding of the unity of physics. 8. Translate physical descriptions into mathematical equations, and conversely, explain the physical meaning of mathematical results. 9. Examine intermediate results or other quantities that could be used to ensure a solution is physically reasonable. 10. Develop their ability to communicate ideas of science. 11. Identify what they don't understand, and ask specific questions in order to gain understanding. 12. Develop an expertise in experimental methodologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and apply the fundamentals of vector calculus. 2. State, explain, and apply Newton's three laws of motion. 3. Understand fundamentals of dynamics, work and energy, and gravitation and central force motion. 4. Understand and apply the basic idea of work-energy theorem to physical systems. 5. Apply the principle of conservation of mechanical energy to solve simple problems in mechanics. 6. Calculate the pressure and density of fluid at different depth. 7. Explain the Hydrostatic Pressure. 8. Explain Pascal's principle and the operation of a hydraulic lift. 9. Define and describe the buoyant forces and Archimedes's principle, furthermore, weighing an object immersed in a fluid. 10. Derive the equation of continuity for fluids. 11. Use Bernoulli's equation to calculate flow speed and pressure of a moving fluid for simple situations. 12. List the various terms associated with electrical circuits. 13. Identify the basic circuit elements and their applications. 14. Discuss the reaction and involvement of atoms in electric circuits. 15. Describe Bohr model of an atom. 16. Describe electrical power, charge, and current. 17. Define Ohm's law. 18. Understand the principles of semiconductor diode and transistor. 19. Illustrate the basic principles of rectifiers and DC power supplies. 20. Explain the conduction, convection and radiation heat transfer. 21. Define the bias and its effect on the depletion region. 22. Define the barrier potential and its effects.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following: **Part A – Mechanics Principles** **Basic Quantities, including:** [5 hrs] - State SI units, and write the units and their abbreviations correctly. - Determine whether a physical quantity is a vector or a scalar. - Distinguish between kinematic and kinetic energy. - Define, calculate, and distinguish between distance and displacement, average and instantaneous speed and velocity, and average and instantaneous acceleration. **Newton's three laws and it is applications:** [5 hrs] - State, explain, and apply Newton's three laws of motion. - Differentiate between static and kinetic friction, and solve friction problems. - State and apply Hooke's law for ideal springs. **Work, energy and power:** [10 hrs] - Define work, and calculate the work done by a constant force in one and two dimensions. - State the work–energy theorem, and use it to solve problems. - Apply the principle of conservation of mechanical energy to solve simple problems in mechanics. - Calculate both kinetic and potential energy. - Calculate the power. **Momentum and impulse:** [5 hrs] - Define linear momentum, and calculate and compare momenta of various objects. - Express Newton's laws in terms of rates of change of linear momentum. - Define and calculate impulse. **The simple harmonic motion:** [4 hrs] - State, explain, and apply the simple harmonic motion. **Universal gravitational force:** [6 hrs] - Solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations (i.e. Earth, Moon, Sun and etc.). **Fluid Mechanics:** [20 hrs] - Calculate the pressure and density of fluid at different depth; - Explain the Hydrostatic Pressure; - Explain Pascal's principle and the operation of a hydraulic lift; - Define and describe the buoyant forces and Archimedes's principle, furthermore, weighing an object immersed in a fluid; - Derive the equation of continuity for fluids; - Use Bernoulli's equation to calculate flow speed and pressure of a moving fluid for simple situations. **Heat transfer:** [10 hrs] - Define and describe the flow of heat through a material by direct molecular contact (conduction). - Define and describe the transfer of heat by the movement or flow of molecules - liquid or gas (convection). - Define and describe the transfer of heat by electromagnetic waves through a gas or vacuum (Radiation). **Part B – Electrical Principles** **Atomic and its structure:** [10 hrs] - Define and describe the Bohr model of an atom.

	- Define electron, proton, neutron and nucleus. - Explain electron shells and orbits. - Explain and calculate the energy levels. - Define valence electron, free electron and ions. **Semiconductors materials:** [5 hrs] - Explain insulators, conductors, and semiconductors and how they differ. - Define valence band and conduction band, and compare between the semiconductor atom and the conductor atom. **Diodes and Transistors:** [8 hrs] - Explain the electrical symbols for a diode and diode applications. - Define the bias and its effect on the depletion region. - Define the barrier potential and its effects. - Explain the electrical symbol of a transistor, and describe the basic transistor operation. **Current and Voltage:** [5 hrs] - Understanding the fundamental concepts of current and voltage. - Explain the electrical circuit elements and its objects. **Ohm's law and Kirchhoff's law:** [7 hrs] - Define Ohm's law, and calculate power and energy - Analyze the electric circuits in both parallel and series connections. - Define Kirchhoff's law, and analysis the electrical circuits using Kirchhoff's law.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي الاسبوعي الغير منتظم للطالب	2.5
Total SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	4,6,8, 10, and 13	LO #1
	Assignments	5	5% (5)	3,5,7,9and 11	LO #1
	Seminar	1	5% (5)	13	LO #1
	Report	1	5% (5)	12	LO #1
Summative assessment	Midterm Exam	1	10% (10)	8	LO #1
	Final Exam	1	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج االاسبوعي النظري

	Material Covered
Week 1	Introduction to physics; Standards of length, mass and time; Scalar and Vector quantities; Kinematics; Position, Displacement and Distance; Speed, Velocity and Acceleration.
Week 2	Forces and motion; Mass and gravity force; Newton's three laws of motion.
Week 3	Spring forces and Hooke's law; Friction forces; Uniform circular motion; Work.
Week 4	Kinetic and Potential Energy; The work-kinetic energy theorem; Conservation of total mechanical energy; Power.
Week 5	Linear momentum; Momentum and kinetic energy; Rate of change of linear momentum and Newton's laws; Law of conservation of linear momentum; Impulse.
Week 6	Simple Harmonic Motion; Universal gravitation; Newton's law of universal gravitation; Free-fall acceleration and the gravitational force; and Solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations.
Week 7	Fluid mechanics; Pressure and density of fluid at different depth; Hydrostatic pressure; Pascal's principle and the operation of a hydraulic lift.
Week 8	Buoyant forces and Archimedes's principle; the equation of continuity for fluids; and the Bernoulli's equation.
Week 9	Heat Transfer (Conduction, Convection, and Radiation).
Week 10	Atoms Structure; Atomic Energy Level; and Materials Used in Electronics.
Week 11	Conduction in Metals, Semiconductors, and Insulators; Intrinsic and Extrinsic Semiconductors; N-Type and P-Type Semiconductor; The PN Junction.
Week 12	Diodes and Transistors.
Week 13	Current and Voltage; electrical circuit; and Ohm's Law.
Week 14	Power and Energy; Parallel and Series Networks.
Week 15	Kirchhoff's Law.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج االسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ **Physics for scientists and engineers: An interactive approach**. Robert Hawkes, Javed Iqbal, Firas Mansour, Marina Milner-Bolotin and Peter Williams. 2nd edition, 2019. ➢ **Fundamentals of Physics**. David Halliday, Robert Resnick and Jearl Walker. 10th Edition, 2014. ➢ **Engineering Mechanics: Dynamics - Volume 2**. J.L. Meriam, L.G. Kraige and J. N. Bolton. 8th edition, 2015.	Yes
Recommended Texts	➢ **Electronic Devices**. Thomas L. Floyd. 9th Edition, 2012. ➢ **Physics for Scientists and Engineers with modern physics**. Raymond A. Serway and John W. Jewett. 9th edition, 2014.	No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Arabic language I**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM1011**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGI		**Semester of Delivery**	one	
Administering Department	ME		**College**	COE	
Module Leader	Ruqayah hammed ali		**e-mail**	ruqayah .h.a@uomosul.edu.iq	
Module Leader's Acad. Title	lecture		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	14/05/2026		**Version Number**	2.0	
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. "The objective of this semester is to introduce students to the main topics of the Arabic language subject. The semester will cover the fundamental requirements of Arabic language definitions, grammatical rules for tenses, and the development of grammatical skills regarding singular and plural forms, as well as nouns that are indeclinable (diptotes), in addition to rhetoric and practical application. By the end of the semester, students will have acquired a broad knowledge of these concepts, which will be achieved through theoretical lectures, tutorials, homework assignments, and reports related to the discussed topics."
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	2. To familiarize students with correct Arabic vocabulary, structures, and proper styles in an engaging and attractive manner. 3. To encourage students to utilize their free time for reading, research, and utilizing the library. 4. To enable students to read correctly and to acquire the ability to use the language accurately in communicating with others. 5. To develop the student's literary taste, enabling them to appreciate the aesthetic aspects, meanings, and imagery in speech styles. 6. To enhance the student's spelling and handwriting skills, enabling them to write official letters and correspondence correctly. 7. To enable students to write practical and theoretical reports, as well as presentations, in clear and correct Arabic. 8. To develop the ability to acquire and apply new knowledge and to utilize appropriate learning strategies. 9. To develop the ability to participate and work professionally and ethically within multidisciplinary teams
Indicative Contents المحتويات الإرشادية	Part 1: Introduction to the Arabic Language (4 hours) • Introduction to the Arabic language • Definition and characteristics of the Arabic language Part 2: Grammatical Rules, including: (6 hours) • The past tense verb (Al-Fi'l Al-Madi) • The five verbs (Al-Af'al Al-Khamsa) • [Note: The "past tense verb" was repeated twice in the original text, it has been listed once here for consistency]

	Part 3: Developing Grammatical Skills, including: (6 hours) • The dual and plural forms (Sound masculine plural and Sound feminine plural) • The style of exclamation (Al-Ta'ajjub) • Diptotes / Nouns immune to inflection (Al-Mamnu' min Al-Sarf) • Abstract and augmented verbs (Al-Mujarrad wal-Mazeed) Part 4: Rhetoric and Practical Application (8 hours) • Metaphor (Al-Isti'arah) • Alliteration / Pun (Al-Jinas) • Antithesis / Oxymoron (Al-Tibaq) • Simile (Al-Tashbeeh)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	"Broadening students' horizons regarding the Arabic language subject, mastering the fundamental concepts of Arabic and rhetoric, and developing the ability to distinguish between tenses. This semester comprises multiple components, including lectures, educational programs, discussions, homework assignments, and e-learning platforms. The course will be taught in Arabic, and all mandatory assignments must be submitted within the deadlines to be eligible for the exam."
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	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	"Introduction to the Arabic language, its definition, and characteristics."
Week 2	"Grammatical Rules: The Past Tense Verb"
Week 3	"Grammatical Rules: The Present Tense Verb"
Week 4	"Grammatical Rules: The Five Verbs"
Week 5	"Developing Grammatical Skills: The Dual and Plural (Sound Masculine Plural and Sound Feminine Plural)"
Week 6	"Developing Grammatical Skills: Exclamation, Diptotes, and Abstract and Augmented Verbs"
Week 7	Midterm exam
Week 8	"Rhetoric and Practical Application: Metaphor"
Week 9	"Rhetoric and Practical Application: Alliteration / Pun"
Week 10	"Rhetoric and Practical Application: Antithesis"
Week 11	"Rhetoric and Practical Application: Simile"
Week 12	"Spelling Errors"
Week 13	"Administrative Correspondence"
Week 14	"Rules and Regulations of Numbers and Counted Nouns"
Week 15	"Rules and Regulations of Numbers and Counted Nouns"
Week 16	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	جامع الدروس العربية / مصطفى الغلاييني	yes

Recommended Texts	النحو الوافي / عباس حسن	yes	
Websites	https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/		

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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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.

LEVEL UGI
SEMESTER 2

MODULE DESCRIPTION FORM

Module Information					
Module Title	**ENGINEERING MECHANICS- STATICS II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME151**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UG1	**Semester of Delivery**		2
Administering Department		MEC	**College**	COE	
Module Leader	Ghaidaa Ibrahem Husaen Alsarraj		**e-mail**	Ghaidaa.alsarraj2019@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		None	**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes, and Indicative Contents	
Module Aims	1. To develop the ability of first-year students to analyze the effects of forces, distributed loads, and moments acting on engineering bodies and structures. 2. To enhance problem-solving skills and the understanding of force analysis through the application of equilibrium principles to frames and machines. 3. To understand and construct free-body diagrams for engineering systems subjected to different loading conditions. 4. To analyze the concepts of centre of mass, center of gravity, and centroid in relation to engineering applications and structural systems. 5. To apply the principles of moment of inertia in analyzing the behavior and stability of simple engineering members and structures.
Module Learning Outcomes	1. The course provides fundamental knowledge of the physical and mathematical principles related to engineering mechanics, frames, and machines. 2. Analyze and calculate the resultant effects of concentrated and distributed loads acting on bodies in equilibrium conditions. 3. Recognize forces and apply the free-body diagram approach to solve problems related to engineering structures and mechanical systems. 4. Explain the essential procedures for drawing free-body diagrams of frames, machines, and different engineering members. 5. Discuss the influence of reaction forces and normal forces on engineering bodies and structural systems. 6. Describe the concepts of center of gravity, centre of mass, and centroid and their applications in engineering analysis. 7. Identify and apply the principles of moment of inertia in analyzing the behavior and stability of engineering elements and structures.
Indicative Contents	Indicative content includes the following. - Part A - General Principles of Structures[25] hrs. - **Fram and Machine** - FBD of a frame or machine - Forces acting at the joints - Forces acting at the supports - Analysis of a Frame and Machine - Part B – Principle of Distributed Force. . [35] hrs. **Distributed Force** - Simple distributed load - Beams – External Effects. **Center of Mass and Centroid.**

	- Centeroide of Lines,Areas and Volumes - **Composite bodies** Part C – Principle of Friction[25]hrs. - Frictional Phenomena - Dry Friction - Draw a FBD. - Part D – Principle of Moment of Inertia .[35] hrs. - Determine the MoI for an area - • Mass moment inertia . - • Parallel axis theorem - • Radius of gyration Moment and products of inertia of area.

Learning and Teaching Strategies	
Strategies	This course aims to develop the capacity of first-year students to predict the effects of:friction, centroid, trusses,moment of inertia and the distributed loads that are applied to bodies. Thus, the primary strategy of this course is to encourage students' participation in discussions and to solve the exercises. Also, refining and expanding their critical thinking skills to analyze and study the effect of applied forces on bodies. This strategy is achieved through classes, interactive tutorials, and by considering real applications that interest the students.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2.5
Total SWL (h/sem)	100		

Module Evaluation				
	Time/No	**Weight (Marks)**	**Week Due**	**Relevant Learning**

					Outcome
Formative assessment	**Quizzes**	3	10% (30)	5,8,13	LO # 2,5and7
	Assignments	2	2% (4)	3,6	LO # 2,3,4and 7
	Semenar	1	4% (4)	11	LO # 5,6
	Report	1	2% (2)	12	LO # 5,6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	9	LO # 1,4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Identify and analyze frame and machines.
Week 2	Practical applications of frame and machine analysis
Week 3	Learn about distributed forces and their effect on bodies.
Week 4	Understand the center of mass and center of gravity
Week 5	Center of Mass and Gravity + Review Session
Week 6	Identify and analyze frame and machines.
Week 7	Midterm Exam
Week 8	Introduction to the concept of friction.
Week 9	Analysis of the phenomenon of dry friction.
Week 10	Applications of Friction in Machines.
Week 11	Understand Moment of inertia
Week 12	Study of the moment of inertia of areas and masses
Week 13	Applications of the moment of inertia of areas and masses
Week 14	Parallel axis theorem and Radius of gyration Moment
Week 15	**The final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Meriam, James L., and L. Glenn Kraige, "Engineering mechanics: statics", John Wiley & Sons, 2012.	Yes
Recommended Texts	Hibbeler, RC, "Engineering Mechanics Statics", 14th edition, 2016.	No
Websites		

Grading Scheme				
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 is required, but credit awarded
	F – Fail	راسب	(0-44)	A 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.

Ghaidaa Ibrahem Husaen

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME152**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		ME	**College**	COE	
Module Leader	Dr. Omer S. Alabidalkreem		**e-mail**	Omerphd18@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 6. Write clear mathematical arguments including effective use of physical equations. 7. Develop a solid understanding of the fundamental principles of physics, including: a. a firm conceptual grasp of the central principles of physics, b. an ability to work with the concepts mathematically, and c. a functional understanding of how these ideas play out in the real world. 8. Use graphs and diagrams to convey results. 9. Decide on strategies to be used and assumptions that need to be made. 10. Use both algebraic and geometric approaches in problem-solving. 11. Develop a flexible and creative problem-solving ability. 12. Develop an integrated understanding of the both the definite and finite integral. 13. Integrate all the types of equations those be able to integrate such as transcendental equations (logarithm and hyperbolic), linear, non-linear, and rational equations. 14. Find the dimensions such as length, area, and volume for any shapes by utilizing the integrate. 15. Develop their ability to communicate ideas of science.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	21. Understand how to estimate the Area between curves. 22. Explain the Indefinite Integrals and the Substitution Method. 23. Understand the Volumes calculation Using Cross-Sections. 24. Understand the Volumes calculation Using Cylindrical Shells. 25. Explain Arc Length calculation. 26. Understand the Areas of Surfaces of Revolution. 27. Explain The Logarithm Defined as an Integral. 28. Using Basic Integration Formulas. 29. Understand Integration by Parts. 30. Explain the Trigonometric Integrals and substitutions. 31. Understand the Integration of Rational Functions by Partial Fractions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

	Introduction to Integration: [10 hrs] - The finite integral. - The In-finite integral. - Examples and solved problems. **Dimensions calculation:** [45 hrs] - Estimate the area between and under curves. - Calculate the volume of the solid objects using many techniques. - Calculate the volume of the hollow objects using many techniques. - Calculate the area of the surface of revolution. - Find the length of any curves. **Transcendental functions:** [30 hrs] - Natural Logarithm. - Exponential function. - The general exponential function. - Logarithm with base a($\log_a x$). - Hyperbolic function. - Inverse of hyperbolic function. - Differentiation of trigonometric function. - Examples and solves problems. **Technique of Integration:** [40 hrs] - Integration by parts. - Trigonometric Integrals. - Trigonometric of substation. - Integral of rational functions by partial fractions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4.2

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	3	10% (10)	4, 9, 12	LO #1, 2, 8 and 10
	Assignments	4	10% (10)	2,6,10, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 11
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-6
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to integral.
Week 2	Estimation of the area between curves.
Week 3	Estimation the area under the curves.
Week 4	Solid object volume calculation by using disk method.
Week 5	Hollow object volume calculation by using disk method.
Week 6	Solid object volume calculation by using shell method.
Week 7	Hollow object volume calculation by using shell method.
Week 8	Calculate the area of the surface revolution.
Week 9	Calculate the length of any curve.

Week 10	Natural logarithm function.
Week 11	The general exponential function. Logarithm with base a($\log_a x$).
Week 12	Hyperbolic function. Inverse of hyperbolic function.
Week 13	Integration by parts. Trigonometric Integrals.
Week 14	Trigonometric Substitutions. Integration of Rational Functions by Partial Fractions.
Week 15	Solved Problems.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus and Analytic Geometry by George B. Thomas, any edition.	No
Recommended Texts		
Websites		

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

	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Physics II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME153**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		ME	**College**	COE	
Module Leader	Ahmed S. Abdalaziz		**e-mail**	Ahmed.sadoon@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Awad H.Khidhir		**e-mail**	Awad1956@uomosul.edu.iq	
Peer Reviewer Name		None	**e-mail**	None	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes, and Indicative Contents

Module Aims	16. To develop the capacity of first-level students to recognize types of metals, their properties, and applications. 17. To develop problem-solving skills and an understanding of forces analysis by applying the equilibrium principle. To enrich students' knowledge and develop their skills in the principle of heat treatments of steels and cast irons. 18. To understand the macro- and microstructure of metal s. 19. Analysis of the phase diagrams of alloy systems and understanding their effect on mechanical properties of metals. 20. Applying the equilibrium principle to simple trusses and frames.
Module Learning Outcomes	8. The course offers basic knowledge of physical metallurgy. 9. Describe the standard tests used for determining metals' mechanical properties. 10. Explains the atomic structure and atomic bonding in metals. 11. Discuss the effect of microstructure on the mechanical properties of metals. 12. Analyze the phase diagrams and the microstructures of alloys in thermal equilibrium conditions.
Indicative Contents	Indicative content includes the following. <u>Part A - General Principles</u> **Basic Quantities, including**: - Physical properties - Mechanical properties such s strength, ductility, toughness, and hardness. - Stress-strain relationships - Material testing, including tensile, impact, toughness, and hardness [30 hrs] **The structure of atoms** - Atoms are held together in solids by bonding. - Particle arrangement in solids. - Microstructure examinations - The structure of metals and deformation mechanisms [30 hrs] **Phase diagrams of metals** - Solidification and solid solution. - The phase diagram of binary alloys depends on the solubility conditions, such as complete soluble, partial soluble, and complete insoluble. - Eutectic composition, peritectic reaction, and eutectoid reaction [35 hrs]. <u>Part B – Principle of Thermal Equilibrium diagram and heat treatment</u>

	- Iron-Carbon system - Heat treatment of ferrous metals. - Microstructural transformations [30].

Learning and Teaching Strategies	
Strategies	This course aims to enrich the knowledge of first-level students about the general aspects of metallurgy and engineering materials, including classifications of metals and their properties, mechanical tests, atomic structure, atomic bonding, miller indices, alloy systems, and microstructures. Thus, the primary strategy of this curse is to encourage students to recognize different types of materials in real life. Also, to refine their thinking skills to analyze the microstructure of metals and understand their effects on the mechanical properties of metals. This strategy is achieved through classes, interactive discussions, different lab experiments, seminars, and by considering real applications.

Student Workload (SWL)			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	125		

Module Evaluation					
		Time/No	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (10)	4, 8,13	LO #1, 2, 3 and 5
	Assignments	2	10% (10)	2, 6,12	LO # 2, 4, and 5
	Projects / Lab.	2	10% (10)	5, 10	LO # 2, 3, 4, and 5

	Report	1	5% (5)	13	LO # 2, 3, and 5
Summative assessment	**Midterm Exam**	1 hr	15% (15)	9	LO # 1-4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to Materials and Properties.
Week 2	Materials types and Mechanical properties of metals (2).
Week 3	Structure examination (Macro-, micro-).
Week 4	Atomic structure, atomic bonding in materials. Miller indices
Week 5	Solidification of metals and alloys
Week 6	Cooling curves, types, and constructions
Week 7	Phase diagram for alloy systems.
Week 8	Thermal equilibrium diagrams (1).
Week 9	Thermal equilibrium diagrams (2).
Week 10	Ferrous alloys and Iron-Carbon system (1).
Week 11	Ferrous alloys and Iron-Carbon system (2).
Week 12	Ferrous alloys and Iron-Carbon system (3).
Week 13	Microstructural transformation and heat treatment (1).
Week 14	Microstructural transformation and heat treatment (2).
Week 15	**The final Exam**

Delivery Plan (Weekly Lab. Syllabus)

Week	Material Covered
Week 1	Specimen preparation for microscopic examination.
Week 2	Microstructure of single phase structures.
Week 3	Cooling curves construction.
Week 4	Thermal equilibrium diagram construction.
Week 5-6	Correlation between microstructures. Thermal equilibrium diagram lead-tin system phases percentages.
Week 7	Microstructure of steels.
Week 8	Microstructure of cast iron types.
Week 9-10	Heat treatment of steel.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	-"Fundamentals of material science and engineering", William.d.callister, 4th ed., John weily & sons, 2012, U.S.A	Yes
Recommended Texts	Engineering metallurgy", R. A. Higgins, part I, 6th ed, London.	Yes
	Technology of engineering materials, M. Philip & W. Bolton, BH, 2002, London.	No
Websites		

Grading Scheme				
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 is required but credit awarded
	F – Fail	راسب	(0-44)	A 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	**Introduction to Electrical Engineering**			**Module Delivery**	
Module Type	**B**			☒ **Theory**	
Module Code	**ME154**			☐ **Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial**	
				☒ **Practical**	
				☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	ME		**College**	COE	
Module Leader	Maan Hussein Abbas		**e-mail**	maanhusein1991@gmail.com	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	MSc	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 10. Introduce the fundamentals of circuit analysis. 11. Provides examples of the elementary circuit elements; the resistor, the capacitor, and the inductor, which provide linear relationships between voltage and current and by using Standard international units. 12. To provide the student with the necessary skills to analyze practical ac electric circuits by using different circuit analyzing methods like Nodal analysis and Loop analysis. 13. To understand and predict electrical circuit variables, both ac and dc in standard circuit configurations (series/parallel circuits) and specify circuit components to satisfy electrical circuit design. 14. To develop theoretical and practical analysis techniques in order to predict behavior of various configurations of electrical/electronic circuits (ac and dc) by means of calculation. 15. Defines amplitude, effective, mean, peak to peak value, frequency, and periodic signal for alternative current and use the polar representation to analyze the AC circuits. 16. Introduction to power electronic rectifier Electric battery –charger and DC to AC invertors. 17. Use graphs and diagrams to convey results. 18. Decide on strategies to be used and assumptions that need to be made. 19. Use both algebraic and geometric approaches in problem-solving. 20. Develop a flexible and creative problem-solving ability. 21. Examine intermediate results or other quantities that could be used to ensure a

	solution is physically reasonable. 22. Develop their ability to communicate ideas of science. 23. Identify what they don't understand, and ask specific questions in order to gain understanding. 24. Develop an expertise in experimental methodologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. List the various terms associated with electrical circuits. 2. Identify the basic circuit elements and their applications. 3. Describe electrical power, charge, and current. 4. Define Ohm's and Kirchhoff's law. 5. Draws sinusoidal waveform and describes sinusoidal alternative circuits. 6. Defines amplitude, effective, mean, peak to peak value, frequency, and periodic signal. 7. Explains capacitance, inductance, and impedance. 8. Defines complex number as rectangular and polar form. 9. Solve serial and parallel ac circuits. 10. Calculates equivalent impedance. 11. Calculates current and voltage for each circuit element and shows them in complex domain. 12. Draws power triangle and calculates power factor. 13. Uses mesh analysis. 14. Writes equation for node analysis. 15. Applies superposition, Thevenin, and Norton theorems. 16. Be able to state basic technical concepts concisely and accurately. 17. Analyze electronic circuit designs in order to determine circuit parameters and performance. 18. Practical ability to design and install simple electrical circuit for Domestic electrical installation including relays and timers.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Electrical circuits introduction:** [8 hrs] - Explaining the Standard international units and introduction to basic components circuits - Introduce the Electrical Sources (voltage sources+ series and parallel connection of them Current source (DC+AC)

	- Represent an electrical circuit using a circuit diagram. **Ohm 's law & Kirchhoff's laws with examples** [9 hrs] - Definition of the two laws. - Apply Kirchoff's first Law and determine the current entering and leaving - a circuit junction. **Electrical circuits analysis:** [20 hrs] - Clarifying Resistors connections types and its equivalent. - Explain Voltage and current divider. - Apply Thevenin & Norten theories. - Using Nodal analysis. - Using Mech analysis. - Correctly identify common components in a circuit diagram. - Calculate current, potential difference and resistance in a series circuit for - the whole circuit, and for individual components. - Calculate current, potential difference and resistance in a parallel circuit - for the whole circuit, and for individual components. - Break down and simplify a combined series and parallel circuit, and - determine current, potential difference. - Describe the principles behind the parallel and series circuit rules. - **AC circuits:** [20 hrs] - Introduce the Alternative current. - Explain Phase angle & pharos diagrams for alternating quantities. - Complex numbers &polar representation and Power, power factor, power triangle & p.f. correction. **Three phase circuits:** [9 hrs] - Explain the concept of the three-phase circuit. - Explain Balanced and unbalanced loads - Explain Phase relationships in three phase systems - Phase vectors - Three phase circuits and Delta –star and star –delta transformation with exp. **Sensors &transducers:** [12 hrs] - Understanding of the theoretical and practical aspects of sensors - Understanding the fundamental concepts of the Sensors and transducers

	principle of operation of sensor's and Resistor as a sensor. - Explaining the Capacitor as a sensor, also Inductive sensor and Piezo –electric sensor +thermo –couple **Electrical measurements:** [8 hrs] - Define measurement instrument and elements - Define electric parameters and their units of measurement - Explain the principle of Ammeter and voltmeter and Electric Multipurpose Measuring device Avo +Briddge circuits. **Practical:** [40 hrs] - Practical ability to design and install simple electrical circuits for domestic electrical installation including relays and timers etc. as listed in the practical weekly plan.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	4, 8, 12	LO #1, 2,4,5,9, 10 and 11
	Assignments	2	5% (5)	3, 10	LO # 3, 4 and 6
	Projects / Lab.	1	5% (5)	14	LO# 18
	Report	1	5% (5)	9	LO # 7
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-4, 9, 10, 13 and 15
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Standard international units and introduction to basic components circuits (resistor, capacitor and inductive) Electrical Sources (voltage sources+ series and parallel connection of them with exp.
Week 2	Current source (DC+AC) with exp. Voltage and current sources conversions and energy laws with exp.
Week 3	Ohm 's law & Kirchhoff's laws with examples.
Week 4	Resistor in series and parallel and R equivalent with exp.
Week 5	Voltage divider rule +current divider rule and circuits analysis –superposition with examples
Week 6	Thevenin's & Norten's theorem with examples
Week 7	Nodal analysis with examples.
Week 8	Loop analysis with examples.
Week 9	Alternating current circuits (Introduction definition) alternating and r.m.s. quantities and Phase angle & pharos diagrams for alternating quantities.
Week 10	Complex numbers &polar representation and Power, power factor, power triangle & p.f. correction.
Week 11	Three phase circuits and Delta –star and star –delta transformation with exp.
Week 12	Material 's electric & magnetic characteristics and Ferromagnetic material.
Week 13	Sensors &transducers principle of operation of sensor's; Resistor as a sensor.
Week 14	Capacitor as a sensor +Inductive sensor and Piezo –electric sensor +thermo –couple

Week 15	Electrical measurements (principle of Ammeter +voltmeter) Electric Multipurpose Measuring device Avo +Briddge circuits).
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Domestic electrical installation
Week 2	One lamp circuit installation and Florescent lamp installation
Week 3	Lamp testing installation and Electric bell installation
Week 4	Introduction to industrial installations
Week 5	Contactor circuit-assembling and disassembling
Week 6	Contactor circuit of automatic changer
Week 7	Contactor circuit of home load supplied by many supplied sources at the same time
Week 8	Timer circuit introduction and application
Week 9	Timer-contactor circuit connection for no load condition
Week 10	Timer-contactor circuit connections for load condition
Week 11	Timer- relay circuits application to control contactor operation
Week 12	Timer – circuits with tow contactors circuits
Week 13	Timer- relay circuits with tow contactors circuits
Week 14	Students submission of their practical project by the end of the semester .
Week 15	Project's discussion and assessment
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	أصول الهندسة الكهربائية لطلبة كلية الهندسة	Yes
Recommended Texts	➢ **A Text book of electric technology B.L.Theraja.** ➢ **Engineering circuit analysis William H.Hayt.**	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	**Energy and Sustainability**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME155**				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	ME		**College**	COE	
Module Leader	Dr. Ali Azzam Mohammed		**e-mail**	ali.alkhabbaz@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	08/13/2024		**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	Students will be able to: • Understand the fundamental principles of energy and sustainability and their importance in modern society • Identify different energy sources, including fossil fuels, nuclear, and renewables like solar, wind, and geothermal • Analyze the environmental, economic, and social impacts of energy production and consumption • Promote awareness of sustainable practices in resource utilization to protect the environment • Develop the skills and knowledge necessary for careers in environmental consulting, energy management, and sustainability policymaking
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An ability to distinguish, identify, define, formulate, and evaluate renewable energy systems by applying fundamental principles of solar, wind, hydro, biomass, and other sustainable energy technologies to address energy-related challenges using scientific and engineering concepts. 2. An ability to develop and assess sustainable energy solutions that meet environmental, economic, and societal needs within specified constraints by applying principles of sustainability, energy efficiency, resource management, and clean energy technologies. 3. Use appropriate analytical tools, simulation software, and experimental methods to evaluate renewable energy and energy storage systems, perform measurements and tests, interpret results, and apply engineering judgment to assess system performance, environmental impacts, and contributions to mitigating global warming and climate change.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Review of basic principles of heat transfer, thermodynamics:** [25 hrs.] - Basic principles of heat transfer - Basic principles of thermodynamics **Introduction to pollution** [25 hrs.] - Introduction of pollution - Types of pollution - Main consequences of pollution **Non-Renewable Energy Sources:** [25 hrs.] - Introduction to non-renewable energy sources - Types of fossil fuels - Climate change and global warming

	Renewable energy sources: [25 hrs.] - Introduce to renewable energy sources - Types of renewable energy sources - Advantages and disadvantages of using clean energy sources **Sustainable energy systems:** [25hrs.] - Introduction to sustainable energy - Energy storage systems - Differences between renewable and sustainable systems

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The teaching approach adopts contemporary educational practices that balance theoretical knowledge with practical application to strengthen students' comprehension of energy and sustainability principles. The strategy includes: 1-Engaging lectures that promote active participation, discussion, and knowledge exchange. 2-Analysis of real-world case studies to examine current challenges and emerging opportunities within the energy sector. 3-Integration of multimedia resources, including videos, animations, and simulation tools, to enhance learning experiences. 4-Workshops and collaborative group activities designed to develop research capabilities, analytical skills, problem-solving abilities, and critical thinking. 5-Project-based learning activities that encourage students to design and evaluate practical solutions for sustainable energy challenges. 6-Promotion of independent learning through the use of supplementary materials, academic references, and online resources. 7-Ongoing assessment through quizzes, assignments, presentations, and class participation to monitor progress and foster academic achievement.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	20% (20)	3, 5, 7, 11, 14	LO # 1,2&3
	Assignments	1	5% (5)	10	LO # 1
	Seminar	1	5% (5)	15	LO # 2&3
	Report	1	5% (5)	12	LO # 2
	Class work	5	5% (5)	15	LO # 2&3
Summative assessment	**Midterm Exam**	1hr	10% (10)	8	LO # 1&2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	General introduction to energy and its types and conversions
Week 2	Non-renewable energy sources
Week 3	Renewable energy sources
Week 4	Introduction to environmental pollution and consequences of non-renewable energy
Week 5	Basics of solar energy and types of solar collectors
Week 6	Types of solar cells and their interconnection
Week 7	Basics of wind energy and its utilization
Week 8	Types of wind turbines and performance improvement techniques
Week 9	Basics of hydropower and turbine types
Week 10	Types and design basics of hydropower turbines
Week 11	Introduction to geothermal energy and applications
Week 12	Introduction to sustainable energy
Week 13	Difference between renewable and sustainable energy, key characteristics
Week 14	Basics of energy conversion systems
Week 15	Basics of energy storage systems

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	•Ibrahim Dincer, Azzam Abu-Rayash, Energy Sustainability, Elsevier (2019) •Mehmet Kanoğlu, Yunus A. Çengel, John M. Cimbala, Fundamentals and Applications of Renewable Energy, McGraw Hill (2020)	NO
Recommended Texts	Robert Bennett Dunlap, Sustainable Energy, 2nd Edition (2017)	No
Websites	Google Classroom	

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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language I**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM1021**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		ME	**College**	COE	
Module Leader	Dr. Ahmed Fouad Mahmood		**e-mail**	ahmedfalneama@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		14/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	21. The main objective of this course is to emphasize the fundamental language skills of reading, writing, speaking, listening, thinking, viewing, and presenting. 22. The course includes studies of various literary genres: short story, novel, and non-fiction. 23. The course also helps students to improve their *English language grammar* and *reading* abilities, and becoming more effective use of grammar and natural self-expression in *English*.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	32. In this course the students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening. 33. Students will heighten their awareness of correct usage of English grammar in writing and speaking. 34. Students will improve their speaking ability in English both in terms of fluency and comprehensibility. 35. Students will give oral presentations and receive feedback on their performance. 36. Students will increase their reading speed. 37. Students will improve their reading fluency skills through extensive reading. 38. Students will enlarge their vocabulary.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Grammars [20 hrs]** **Basic Grammar in English:** [7 hrs] - Parts of speech. - Basic English Sentence Structure. - Pronouns. - Tenses. **Active and Passive Voice:** [5 hrs] - Active voice. - Passive voice. - Convert from active voice to passive voice and vice versa. **Comparative and Superlative:** [2 hrs] - Positive, comparative and superlative. **Conditional Sentences:** [2 hrs]

	- Conditional sentences. - If-clauses type I, II, III. **Dependent and Independent Clauses:** [2 hrs] **Simple, Compound, and Complex Sentences:** [2 hrs] **Part B – Reading [15 hrs]** - This section involves reading a variety of literary genres, including short stories, novels, and nonfiction. - Reading some of passages from IELTS books. **Part C – Writing [15 hrs]** - In this part, students will learn to write simple topics and subjects about graphics and figures related to mechanical engineering subjects. - Writing some of topics and essay from IELTS books.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

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	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
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**	3	10% (10)	4, 9, 12	LO #1, 2, 10 and 11
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Parts of speech. Pronouns.
Week 2	Subject, Lexical verbs, Auxiliry verbs, Regular Verb, Irregular Verb.
Week 3	Recognizing Objects and Complements.
Week 4	Adverbials.
Week 5	Tenses.
Week 6	Tenses.
Week 7	Active voice.
Week 8	Passive voice.
Week 9	Convert from active voice to passive voice and vice versa.
Week 10	Positive, comparative and superlative.
Week 11	Conditional sentences, if-clauses type I, II, III.
Week 12	Reading some of passages from IELTS books.

Week 13	English reading practice for beginners.
Week 14	Writing some of passages from IELTS books.
Week 15	English writing practice for beginners.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 1: There are no laboratory experiments.
Week 3	Lab 1: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	➢ Ronald Carter and Michael McCarthy. **Cambridge grammar of English: A comprehensive guide**. Cambridge: Cambridge University Press, 2006. ➢ Rodney Huddleston, Geoffrey K. Pullum. **The Cambridge Grammar of the English Language**, 2002.	Yes
Recommended Texts	➢ **Collins Reading for IELTS** by Els Van Geyte, 2011.	Yes
Websites		

Grading Scheme

مخطط الدرجات

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

(0 – 49)	**F –** Fail	راسب	(0-44)	A significant amount of work is 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	**fundamental**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**UOM1040**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	SEE		**College**	COE	
Module Leader	Hiba Mahdi Younis		**e-mail**	Hiba_alsofy@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	08/13/2025		**Version Number**	1.0	
Relation with other Modules العلاقة مع المواد الدراسية الأخرى					
Prerequisite module	None			**Semester**	
Co-requisites module	None			**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aim هداف المادة الدراسية	1-. The aim of the Democracy and Human Rights module is to provide students from various academic and humanitarian disciplines with the necessary knowledge to understand the close relationship between democracy and human rights, and to recognize their importance in their lives as citizens who are aware of, and committed to, the protection of their rights. 2. To develop students' understanding that human rights have specific limits and boundaries, ending where the rights of others begin; therefore, they are relative and restricted rather than absolute. 3. Human rights are constant and fundamental, even if national laws do not permit them. 4. Human rights are universal, indivisible, and free from discrimination based on color, gender, origin, or ethnicity.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand human rights as rights that enable individuals to live with dignity and humanity regardless of gender, within a legal, political, and social framework derived from the common human nature shared by all people. 2. Understand the concept of the international legitimacy of human rights and the legal instruments that form this legitimacy, in addition to the rights and obligations established at the international level. 3. Understand the legal effect of a state's ratification of international agreements. Through legislative approval, these agreements become part of Iraqi law and are enforceable by courts and public authorities. This may require repealing or amending domestic laws that conflict with the provisions of ratified treaties to ensure proper implementation. 4. Recognize the mechanisms for protecting civilians in armed conflicts under international law. This protection is considered a fundamental right for all people because it promotes human dignity and possesses legal, ethical, and religious dimensions, including within Islamic law. 5. Become familiar with the historical development of human rights and the origins of democracy in its early stages, including how it emerged in the Greek city-states. 6. Understand the democratic process and the principle of separation of powers, whereby authority is distributed among different branches of government rather than concentrated in a single authority, while recognizing that complete separation is difficult to achieve in practice.

	.
Indicative Contents المحتويات الإرشادية	prt One: The Concept of Human Rights and the International Legitimacy of Human Rights — 10 Hours Part Two: Civil and Personal Rights — 10 Hours Part Three: Physical Violations of Human Rights — 10 Hours Total: 30 Teaching Hours + 3 Hours Final Examination = 33 Hours

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The learning and teaching strategy in the course of Democracy and Human Rights relies on interactive lectures and classroom discussions to enable students to understand fundamental concepts such as human rights and the national and procedural mechanisms for their implementation. This is achieved through dialogue, presentations, and discussions that stimulate students' understanding and critical thinking, while deepening both their theoretical comprehension and practical application of these concepts

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)	17	**Unstructured SWL (h/w)**	1.13

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5, 11	LO # 1
	Assignments	1	5% (5)	10	LO # 1
	Practical	1	10% (10)	15	LO # 2&3
	Report	1	5% (5)	12	LO # 2
Summative assessment	**Midterm Exam**	1hr	10% (10)	8	LO # 1&2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	ntroduction to human rights and the national and procedural mechanisms for their implementation
Week 2	The concept of the international legitimacy of human rights, women’s rights, minorities, and persons with disabilities in international conventions.
Week 3	National mechanisms and special or sectoral procedures for implementing and combating sexual violations of human rights.

Week 4	Combating serious human rights violations and protecting human rights during conflicts.
Week 5	Developing students' understanding of human rights through an exploration of the essence of human dignity and its legal and ethical dimensions. The journey begins with the universal principles established by the international human rights framework, then delves into the deep roots of these rights in our rich Islamic heritage and examines how they are honored and protected.
Week 6	International and regional mechanisms for the protection of human rights, accountability methods, and the challenges facing human rights.
Week 7	Mid-term Exam+National and procedural mechanisms for the promotion of human rights
Week 8	Historical concepts of democracy and its foundations. The development of democracy in the modern era and its distinctive features.
Week 9	Democracy in the twentieth century: inclusiveness and global expansion. Patterns of democracy and their development in contemporary contexts.
Week 10	Peace and democracy. Separation of powers and the principles of democratic governance.
Week 11	The relationship between democracy and public freedoms. Guarantees and regulation of rights and freedoms in the democratic system.
Week 12	Media and democracy. Democratic systems compared
Week 13	Democracy in the non-governmental sphere and practical applications.
Week 14	

	Digital transformation in democratic practice (digital democracy). The democratic experiment in Iraq after 2003.
Week 15	1. First part: The concept of human rights and international legitimacy of human rights, 10 hours.
Week 16	Final exam before the end-of-term exam.

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Introduction to basic elements of electrical installations.
Week 2	Components and Symbols used in Electrical Circuits.
Week 3	Electrical Safety.
Week 4	One lamp circuit installation.
Week 5	Two Lamp circuit installation.
Week 6	Introduction to industrial installations.
Week 7	Contactor circuit-assembling and disassembling.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**

Required Texts	• Human Rights and Democracy /	yes
Recommended Texts	Human Rights / Dr. Hamid Hunun Khalid	yes
Websites	• Electronic references: Internet 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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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.

MECHANICAL ENGINEERING

MODULE DESCRIPTION FORM

LEVEL UGII

SEMESTER 3 and 4

SEMESTER 3	
ME201	Engineering Mechanics-Dynamics
ME202	Fluid Mechanics I
ME203	Thermodynamics I
ME204	Mechanics of Materials I
ME205	Physics 3
ME206	Mechanical Drawing
UOM2050	Crimes of the Baath regime in Iraq
UOM2022	English Language 2
SEMESTER 4	
ME251	Fluid Mechanics II
ME252	Thermodynamics II
ME253	Mechanics of Materials II
ME254	Mathematics III
ME256	Mechanical Engineering Laboratory I
UOM2032	Computer 2
UOM2012	Arabic Language 2

LEVEL UGII
SEMESTER 3

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Engineering Mechanics Dynamics**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME201**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level		**UGI**	**Semester of Delivery**		2
Administering Department		ME	**College**		COE
Module Leader	Bakr Noori Alhasan		**e-mail**		bakralhasan@uomosul.edu.iq
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		MSc.
Module Tutor	Name (if available)		**e-mail**		E-mail
Peer Reviewer Name		Name	**e-mail**		E-mail
Scientific Committee Approval Date		12/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes, and Indicative Contents	
Module Aims	1. To present the basic principles of dynamics and help develop proficiency in applying these principles to formulate and solve dynamics problems. 2. To acquire skills in mathematics and physics to solve practical problems of Dynamics. 3. To Apply a general analysis approach to solving kinematics problems. 4. To define and calculate the linear and angular velocities and accelerations for systems of 2D rigid bodies in translation, rotation about a fixed axis, and general planar motion. 5. To solve 2D kinetics problems using force-acceleration, work-energy, and impulse-momentum methods for particles and rigid bodies. 6. To calculate the mass moment of inertia for solids and composite bodies.
Module Learning Outcomes	After completion of the course, the student should be able to: 1. Describe and calculate the motion (position, velocity, acceleration) for particles and solids in plane motion. 2. Apply free-body diagrams and solve Newton's 2nd law for plane problems. 3. Understand the concepts of work, kinetic energy, potential energy relations, as well as linear and angular impulse and momentum. 4. Use different approaches to solve dynamic problems of particles in plane motion. 5. Apply linear and rotational relations for rigid bodies to determine the motions kinematically. The configuration of the system and relative motion are used as well. 6. Analyzing forces to describe the motion of rigid bodies using Newton's 2nd law directly or indirectly using work, energy, impulse, and momentum. 7. Explain and calculate the moment of inertia for rigid bodies.
Indicative Contents	Indicative content includes the following. **Part A – Particles** **Introduction to Dynamics:** [10 hrs] - State the history of dynamics, definitions of kinematics, kinetics, particles and rigid bodies, applications of dynamics, Newton's law, and the main concepts used in dynamics.

	Kinematic of particles/Rectilinear Motion: [10 hrs] - State, explain, and apply displacement, velocity, and acceleration relations. - Using these relations to solve problems in graphical approach and analytical integrations. **Kinematic of particles /Plane Curvilinear Motion** [20 hrs] - State the differential equations in vector analysis for plane motion. - Apply the differential equations in vector forms and analysis in rectangular coordinates. - Apply the equations developed in rectangular coordinates for projectile motion. - Applying normal and tangential coordinates and polar coordinates. - Apply the kinematic analysis to the relative motion of particles. - Determining the motion of constrained motion of connected particles. **Kinetic of Particles/Direct application of Newton's second law:** [20 hrs] - State Newton's 2nd law and the equation of motion. - Using the equation of motion to determine the motion of particles with a free body diagram in rectilinear motion. - Apply the equation of motion and free body diagram to solve problems in the curvilinear motion of particles: Rectangular coordinates, normal and tangential coordinates, and polar coordinates. **Kinetic of Particles/Work energy** [10 hrs] - State the work energy equation as an indirect application of Newton's Second Law. - State the three sources of work as work associated with constant external forces, work associated with spring forces, and associated with gravity. - Clarification the energy side of the equation as a change in kinetic energy. **Kinetic of Particles/Work Potential energy** [10 hrs] - State, explain, and apply the potential energy concept, including the elastic and gravitational energy in the equation. **Kinetic of Particles/Impulse and momentum** [20 hrs] - Solve problems using Newton's law in terms of linear momentum when time is in concern rather than displacement. - State and apply the equation of linear impulse linear momentum equation - Derive the angular momentum that is the moment of linear momentum - Solve problems by the equation of angular impulse angular momentum. - Apply the principles of impulse and momentum for the derivation of the impact equation. - State the coefficient of restitution. **Kinematics of rigid bodies** [40 hrs] - Explain the relations between the angular displacement, velocity, and angular acceleration for rotated bodies. - Derive the equations relating the angular motion with the linear motion and solve problems.

	- Starting with relations derived from the configuration of bodies, to determine motions by multiple differentiations. - Calculations the motions of different links by relative velocity approach and by the instantaneous center zero velocity. - Relative acceleration approach is used to calculate linear or angular movements of bodies. **Kinetics of rigid bodies:** [40 hrs] - Direct Application of Newton's second law: The equation of motion is applied directly to determine the motions or forces for bodies using formulas derived according to the category of rigid body motion i.e., translation, fixed axis rotation, and general plane motion. - The work-energy approach is used for rigid body motion by considering the body's linear and angular movement. - For rigid body motion the impulse and momentum principles is used. **Mass moment of inertia** [20 hrs] - For rotated rigid bodies, the mass moment of inertia is calculated about an axis through the mass center or a parallel axis. The calculation includes determining the mass moment of inertia for composite bodies.

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module is to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	97	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	175		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	4, 9, 12	LO #1, 2, 5 and 7
	Assignments	4	15% (15)	2,5,7, 12	LO # 3, 4, 5,6 and 7
	Projects / Lab.		0% (0)		
	Report		0% (0)		
Summative assessment	**Midterm Exam**	1hr	20% (20)	8	LO # 1-4
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to Dynamics. Kinematics of Particles: Rectilinear motion.
Week 2	Kinematics of Particles: Plane curvilinear motion (1).
Week 3	Kinematics of Particles: Plane curvilinear motion (2).
Week 4	Kinematics of Particles: Constrained motion of connected particles, relative motion.
Week 5	Kinetics of particles: Direct applications of Newton's 2nd law.
Week 6	Kinetics of particles: Work and energy.
Week 7	Kinetics of particles: Impulse and Momentum.
Week 8	Kinetics of particles: Special applications; Impact.
Week 9	Kinematics of Rigid Bodies: Plane motion, absolute motion.
Week 10	Kinematics of Rigid Bodies: Instantaneous center of zero velocity, Relative velocity
Week 11	Kinematics of Rigid Bodies: Relative acceleration.
Week 12	Kinetics of Rigid Bodies: Direct applications of Newton's 2nd law (1).
Week 13	Kinetics of Rigid Bodies: Direct applications of Newton's 2nd law (2).
Week 14	Kinetics of Rigid Bodies: Work and Energy.
Week 15	Kinetics of Rigid Bodies: Impulse and momentum.
Week 16	**The final exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	➢ **Engineering Mechanics: Dynamics - Volume 2**. J.L. Meriam, L.G. Kraige and J. N. Bolton. 8th edition, 2015.	No
Recommended Texts	➢ **Engineering Mechanics' Dynamics",** R. C. Hibbeler	No
Websites		

Grading Scheme				
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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fluid Mechanics I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME202**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		ME	**College**	COE	
Module Leader	Dr. Taha Ahmed Abdullah		**e-mail**	Tahatahamir100@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		06/06/2023	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 1. Classify the fluid properties (compressibility, elasticity, viscosity, surface tension, capillarity). 2. Measure pressure by all types of manometers. 3. Calculate the forces on the immersed bodies and surfaces. 4. Analyze the fluid when subjected to Rotation & linear acceleration. 5. Apply Conservation of mass, continuity equation, Equations of motions- Euler's, Bernoulli's, and work-energy equations. 6. Apply Impulse - Momentum principles and applications. 7. Develop their ability to communicate ideas of science. 8. Identify what they don't understand, and ask specific questions in order to gain understanding. 9. Develop an expertise in experimental methodologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	39. Understand and apply the fundamentals of fluid mechanics. 40. State, explain, and apply fluid mechanics equations. 41. Understand fundamentals of dynamics, work and energy, and gravitation and central force motion. 42. Understand and apply the basic idea of work-energy theorem to physical systems. 43. Apply the principle of conservation of mechanical energy to solve simple problems in mechanics. 44. Calculate the pressure and density of fluid at different depth. 45. Explain the Hydrostatic Pressure. 46. Explain Pascal's principle and the operation of a hydraulic lift. 47. Define and describe the buoyant forces and Archimedes' principle, furthermore, weighing an object immersed in a fluid. 48. Derive the equation of continuity for fluids. 49. Use Bernoulli's equation to calculate flow speed and pressure of a moving fluid for simple situations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Fluid Principles** **Basic Quantities, including:** [15 hrs] - State SI units, and write the units and their abbreviations correctly. - Determine whether a quantity is a vector or a scalar. - Distinguish between fluid mechanics unites. - Define, calculate, and distinguish between viscosity, compressibility, surface tension and capillarity. - Explanation of pressure gauges, their types and applications

	- **Hydrostatic force and their application:** [25 hrs] - State, explain, and apply hydrostatic forces. - Differentiate between immersed gates and their applications. - Calculate the magnitude and center of forces on plane surfaces. - Calculate the magnitude and center of forces on inclined plane surfaces. - Calculate the magnitude and center of forces on curved surfaces. **Part B – Fluid in motion** **Conservation of mass** [10 hrs] - Derive, Define and describe the continuity equation. - Applications of the continuity equation in fluid motion. - Calculate the fluid properties using continuity equation. **Conservation of energy:** [25 hrs] - Derive, Define and describe the Bernoullis equation. - Application of Bernoullis equation in fluid flow. - Calculate the pressure, velocity of fluid flow using Bernoullis equation. **Part C – Fluid Momentum** **Work-energy equations:** [25 hrs] - Explain the effect of pump in the fluid flow head. - Calculate the power generate using turbine in fluid flow. **Momentum equation:** [25 hrs] - Derive the moment of momentum of fluid flow in pipes. - Express Newton's laws in terms of rates of change of linear momentum. - Explain the application of momentum in different objects

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	3	10% (10)	4, 9, 12	LO #1, 2, 10 and 11
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**An introduction to the fundamental of fluid mechanics, basic concepts and applications**
Week 2	**Compressibility and elasticity**
Week 3	**viscosity**
Week 4	**surface tension, capillarity, vapor pressure**
Week 5	**capillarity, vapor pressure**
Week 6	**Pressure applications and measurements**
Week 7	**Forces on immersed bodies – vertical plane surfaces**
Week 8	**Forces on immersed bodies – inclined plane surfaces**

Week 9	**Forces on immersed bodies – curved surfaces**
Week 10	**Fluid subjected to linear acceleration**
Week 11	**Introduction to fluid motion – basic concepts, Conservation of mass.**
Week 12	**Equations of motions- Euler's and Bernoulli's**
Week 13	**Conservation of energy**
Week 14	**Work-Energy Equations**
Week 15	**Momentum equation**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ **Elementary Fluid Mechanics Vennard and Street. 6thedition, 1982.** ➢ **Fluid Mechanics 5th edition Frank M. White. 1999.**	Yes
Recommended Texts	➢ **Bruce R. Munson, Donald F. Young and Theodore H. Okiishi, 2002. "Fundamentals of Fluid Mechanics"**	No
Websites		

Grading Scheme

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Thermodynamic I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME203**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		ME	**College**	COE	
Module Leader	Dr. Younis Najim		**e-mail**	mahalyounis@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		10/06/2023	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 24. Identify the terminology and definitions associated with thermodynamics, review unit system, properties of a system such as density, pressure, temperature and specific heats. 25. Introduce a systematic steps for solving thermodynamic problems. 26. Understand the concept of energy and the definition of its various types, especially, internal energy of a system. 27. Understand the concept of heat and the way energy transfer by heat. 28. Define the concept of work. 29. Introduce the first law of thermodynamics and energy balance. 30. Define a control volume principle, including the transfer of mass and energy crossing the control surface. 31. Understand the concept of a pure substance, phase change, and projection of substance property line on PV, TV, and PT property diagram. 32. Demonstrate the procedures for determining thermodynamic properties of pure substances from tables of property data. 33. Define the hypothetical ideal gas, and demonstrate the ideal-gas equation of state as well as the deviation from ideal gas behavior through compressibility factor. 34. Apply the first law of thermodynamics on closed (fixed mass) system and develop the general energy balance applied to closed systems. 35. Define the specific heats at constant volume and pressure and relate them to the changes in internal energy and enthalpy of ideal gases. Also, determine the internal energy and enthalpy for incompressible substances. 36. Apply energy balance for closed (fixed-mass) systems that involve heat and work interactions for pure substances, ideal gases, and incompressible substances. 37. Apply mass conservation principle to various systems including steady and unsteady flow control volumes. 38. Identify the energy carried by a flow stream crossing a control surface as the sum of internal energy, flow work, kinetic energy, and potential energy of the fluid and to relate the combination of the internal energy and the flow work to the property enthalpy. 39. Solve energy balance problems for common steady-flow devices such as nozzles, compressors, turbines, throttling valves, mixing chambers, and heat exchangers.

	40. Introduce the second law of thermodynamics and identify valid processes as those that satisfy both the first and second laws of thermodynamics. 41. Define and thermal energy reservoirs, reversible and irreversible processes, and introduce the heat engines, refrigerators, and heat pumps. 42. Apply the second law of thermodynamics to theoretical cycles and develop absolute thermodynamic temperature scale. 43. Describe the Carnot cycle, and examine the Carnot principles, idealized Carnot heat engines, refrigerators, and heat pumps. 44. Determine the expressions for the thermal efficiencies and coefficients of performance for reversible heat engines, heat pumps, and refrigerators.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge and Understanding: 1. Demonstrate a solid understanding of the fundamental concepts, laws, and principles of thermodynamics. 2. Explain the relationship between energy, heat, and work in thermodynamic systems. 3. Identify and describe the properties and behavior of pure substances under different conditions. 4. Analyze thermodynamic processes and cycles, including ideal gas behavior and phase equilibrium. 5. Understand the significance of the Second Law of Thermodynamics and its applications in heat engines, refrigerators, and entropy analysis. 6. Identify and describe common thermodynamic processes and cycles used in engineering systems. Intellectual Skills: 1. Apply thermodynamic principles and mathematical techniques to analyze and solve problems related to energy, heat, and work. 2. Analyze and interpret thermodynamic diagrams, property tables, and equations of state. 3. Evaluate and compare the performance of different thermodynamic processes and cycles. 4. Apply thermodynamic concepts and principles to analyze and design engineering systems and real-world applications. 5. Critically assess the limitations and irreversibilities associated with thermodynamic processes. Transferable Skills: 1. Develop problem-solving skills, critical thinking, and logical reasoning abilities. 2. Work effectively in a team environment through collaborative discussions and group projects. 3. Improve time management skills and meet deadlines for assignments and examinations. 4. Enhance communication and presentation skills for effectively conveying

	technical information. 5. Foster independent learning and research skills to explore advanced topics in thermodynamics.
Indicative Contents المحتويات الإرشادية	Module Contents: **1. Introduction to Thermodynamics [15 hr]** - Basic concepts and definitions - System, surroundings, and boundaries - State and properties of a system - Processes and cycles - Energy, Heat, and Work **2. Forms of energy [20 hr]** - First Law of Thermodynamics - Energy transfer mechanisms - Work and heat interactions - Properties of Substances **3. Pure substances and mixtures [15 hr]** - Property diagrams and tables - Equations of state - Phase equilibrium - Ideal Gas Behavior **4. Gas laws and equations [15 hr]** - Ideal gas processes - Specific heat capacities - Real gas behavior - **5. First Law of Thermodynamic and Energy Balance [20 hr]** - - Entropy and irreversibility - Carnot cycle and efficiency - Thermodynamic Processes and Cycles **6. Isobaric, isochoric, isothermal, and adiabatic processes [15 hr]** - Rankine and Brayton cycles - Vapor compression refrigeration cycle **7. Energy balance of open system [20 hr]** - Power generation systems - Refrigeration and air conditioning systems - Thermal energy storage - Combustion and energy conversion

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	3	10% (10)	4, 9, 12	LO #1, 2, 10 and 11
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, concept, and definitions
Week 2	Energy, heat, work,
Week 3	First law of thermodynamics
Week 4	Properties of pure substances, property tables
Week 5	Ideal Gases, real gases, compressibility ratio.
Week 6	Energy analysis of a closed system
Week 7	Energy analysis of a closed system
Week 8	Isobaric and Isochoric Process
Week 9	Isothermal process
Week 10	Adiabatic and polytropic processes
Week 11	Mass and energy analysis of control volume
Week 12	Steady- and unsteady flow, energy balance
Week 13	Nozzles, compressors, turbines
Week 14	Throttling valves, mixing chambers, and heat exchangers
Week 15	Introduction to second law of thermodynamic
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Yunus A. Cengel and Michael A. Boles. Thermodynamics:	Yes

	An Engineering Approach, 7th Ed. McGraw Hill, 2011.	
Recommended Texts	1. Borgnakke, C. and Sonntag, R. E., Fundamentals of Thermodynamics, 7th Ed., John Wiley & Sons, 2009. 2. Moran, M.J., and Shapiro, H.N., Fundamental of Engineering Thermodynamics, 5th Ed., John Wiley &	PDF
Websites		

Grading Scheme مخطط الدرجات				
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
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Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Mechanics of Materials I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME204**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		ME	**College**	COE	
Module Leader	Omar A. Mohammed		**e-mail**	omar.a.mohammed@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		MSc.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		10/06/2023	**Version Number**	1.0	

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

Module Aims, Learning Outcomes, and Indicative Contents	
Module Aims	1. Explaining the behavior of solid bodies subjected to various types of loading. 2. Integrating the knowledge of the strength of materials in engineering design and their applications. 3. Understanding of structural members and their strength, stiffness, and stability. 4. Develop the capability to solve practical engineering problems involving stress and strain analysis in elementary structural members, such as bars and beams. 5. Understanding structure strength, stiffness, and stability concepts are needed for engineering analysis and design. 6. Develop the capability to design new structural members based on strength and stiffness requirements. 7. Develop the capability to check and verify the safety of existing or designed structures.
Module Learning Outcomes	1. To identify, formulate, and solve engineering mechanics problems. 2. Analyze relationships between stress, strain, and displacement in deformable bodies. 3. Find the stress state of bodies subjected to axial, torsional, transverse, and/or bending loads. 4. Calculate stresses and deformation in statically indeterminate structural components. 5. Compute the principle stresses, principle angles, maximum shear stress, and stresses on any arbitrary plane. 6. Transform plane stresses into a different coordinate system. 7. Calculate the stability limits of members subjected to axial compressive loads. 8. Design members and simulate with Solidworks.
Indicative Contents	Indicative content includes the following. **Introduction- Strength of Materials:** [20 hrs] - Introduction to mechanics of materials. - Mechanical properties of the materials. - Simple stress-strain relationship. - Tensile test. - Thermal Stresses **Compound Bars:** [25 hr] - Statically determinate and statically indeterminate systems - Compound bar subjected to the external load - Equivalent or combined modulus - Compound bar subjected to temperature change; Problems. **Shearing Force and Bending Moment Diagrams:** [25 hr] - Shear force (S.F.) and bending moment (B.M) definitions

	- Types of loading beams (concentrated and uniformly distributed loading) - S.F. and B.M. diagrams. **Bending, slope, and deflection of beams:** [30 hr] - Simple bending theory - The second moment of the area - Combined bending and direct stress - Shear stresses owing to the bending - Limitations of the simple bending theory - Slope and deflection of beams - Direct integration method - Macaulay's method for beams **Shear stress distribution:** [20 hr] - Distribution of shear stress due to bending - Application to rectangular sections - Application to I-section beams - Limitation of shear stress distribution theory. **Torsion of circular shafts:** [20 hr] - Simple torsion theory - The polar second moment of the area - Shear stress and shear strain in shafts. - Torsional rigidity. - Torsion of hollow shafts. - Torsion of thin-walled tubes. - Composite shafts -series and parallel connection. - Power is transmitted by shafts.

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	125		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	4, 9, 12	LO #1, 2, 6 and 8
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 8
	Projects / Lab.		0% (0)		
	Report		0% (0)		
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Simple stress and strain
Week 2	Thermal stress, shear stress
Week 3	Compound bars (statically indeterminate problems) (1)
Week 4	Compound bars (statically indeterminate problems) (2)
Week 5	Distributed Load, Shear, and Moment
Week 6	Shearing force and bending moment for beams (1)
Week 7	Shearing force and bending moment for beams (2)
Week 8	Moment of Inertia: Products of Inertia
Week 9	Simple bending theory, Bending stress of beams
Week 10	Shearing stress of beams (1)
Week 11	Shearing stress of beams (2)

Week 12	Slope and deflection of beams (1)
Week 13	Slope and deflection of beams (2)
Week 14	Torsion of circular shafts (1)
Week 15	Torsion of circular shafts (2)
Week 16	**The Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	▪ . J. Hearn. "Mechanics of Materials 1: An Introduction to elastic and plastic deformation of solids and structural materials ", 3rd edition, 2010. ▪ R. C. Hibbeler. "Strength of Materials". 12th edition or any new edition 2012. (Can be downloaded from the Course web page).	Yes
Recommended Texts	○ R. C. Hibbeler. "Strength of Materials". 12th edition 2012. (Can be downloaded from the Course web page).	Yes
Websites		

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

(0 – 49)	**F –** Fail	راسب	(0-44)	A significant amount of work is required.

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Physics III**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME205**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		ME	**College**	COE	
Module Leader	Ahmed N. Rashid		**e-mail**	Ahmed.n.rashid@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ms.c.
Module Tutor	Ghaidaa I. Alsarraj		**e-mail**	ghaidaa.alsarraj2019@uomosul.edu.iq	
Peer Reviewer Name		None	**e-mail**	None	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes, and Indicative Contents	
Module Aims	45. To develop the capacity of third-year students to recognize types of Binary alloy systems for ferrous metals & Ternary alloy systems.

	46. To develop skills and an understanding of Alloy steels. 47. To enrich students' knowledge and develop their skills in alloy steels' heat treatments and engineering applications. 48. To understand the hardenability and surface hardening of steel. 49. To understand nonferrous metals and alloys and bearing metals. 50. To compare different types of strengthening mechanisms of metals. 51. Understand the failure of metals, the strengthening mechanisms, and the international specification of metals and alloys.
Module Learning Outcomes	The course offers knowledge of applied metallurgy of binary alloy systems for ferrous metals and ternary alloy systems. 13. Describe the alloy steels: alloying elements, heat treatments, and their engineering applications. 14. Evaluate the hardenability and surface hardening of metals. 15. Explains the nonferrous metals and alloys, and bearing materials. 16. Analyze the deformation and defects of metals. 17. Describe the strengthening mechanisms of metals. 18. Classify the different types of failure in metals, such as fracture, fatigue, wear, corrosion, and creep.
Indicative Contents	Indicative content includes the following. <u>Part A - Binary & ternary alloy systems</u> **Basic Quantities, including**: - Binary alloy systems with examples. - Ternary alloy systems with examples. [20 hrs] **Alloy steels :** - Alloying element of steel. - Heat treatments of alloy steels. - Engineering applications of alloy steels [25 hrs] **Hardenability and surface hardening** - Surface hardening includes flame hardening, induction hardening, solid carburizing, and nitriding. - Hardenability principle and ruling Section [25 hrs]. **Nonferrous metals and alloys** - Aluminum, copper, lead, nickel, tin, titanium, and zinc, as well as copper alloys like brass and bronze and Bearing metals <u>Part B – Principle of strengthening mechanisms of metals</u> - Work hardening

	- Solid solution strengthening and alloying - Precipitation hardening - Dispersion strengthening - Grain boundary strengthening - Transformation hardening [20]. <u>Part C – Failure of materials</u> - Types of fracture - Fatigue failure - Creep. [20 hrs] **International specification of metals and alloys** - ASTM standards - DIN standards - ISO standard [15 hrs]

Learning and Teaching Strategies	
Strategies	This course aims to enrich the knowledge of second-level students about applied metallurgy of ferrous metal, including binary alloy systems and ternary alloy systems, ad heat treatments, and engineering applications. Thus, the primary strategy of this curse is to encourage students to recognize different types of materials in real life. Also, to refine their thinking skills to analyze the microstructure of metals and understand their effects on the mechanical properties of metals. As a result, students will evaluate and recognize the relationship between the microstructure transformation of metals and their properties and applications. This strategy is achieved through classes, interactive discussions, different lab experiments, seminars, and by considering real applications.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	125		

Module Evaluation

		Time/No	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	4, 8,13	LO # 2, 5 and 6
	Assignments	2	10% (10)	6,12	LO # 2,3, 4 and 6
	Projects / Lab.	2	10% (10)	3,9	LO # 3 and 6
	Report	1	5% (5)	13	LO # 5 and 6
Summative assessment	**Midterm Exam**	1 hr	15% (15)	9	LO # 1-4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Binary alloy systems for ferrous metals
Week 2	Ternary alloy systems (1)
Week 3	Ternary alloy systems (2)
Week 4	Alloy steels: alloying elements, heat treatments, and engineering applications.
Week 5	Alloy steels: alloying elements, heat treatments, and engineering applications.
Week 6	Hardenability and surface hardening
Week 7	Nonferrous metals and alloys (1)
Week 8	Nonferrous metals and alloys (2)
Week 9	Bearing metals
Week 10	Deformation and defects of metals.
Week 11	Strengthening mechanisms of metals (1)
Week 12	Strengthening mechanisms of metals (2)
Week 13	Failure of metals (1).

Week 14	Failure of metals (2).
Week 15	International specification of metals and alloys
Week 16	The final Exam

Delivery Plan (Weekly Lab. Syllabus)	
Week	**Material Covered**
Week 1	Microstructure of steel
Week 2	Microstructure of cast iron
Week 3	Microstructure of alloy steel
Week 4	Heat treatment of steel
Week 5	T.T.T.curve
Week 6	Carburizing
Week 7	Jominy test
Week 8	Flame hardening

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	-"Fundamentals of material science and engineering", William.d.callister, 4th ed., John weily & sons, 2012, U.S.A	Yes
Recommended Texts	Engineering metallurgy", R. A. Higgins, part I, 6th ed, London.	Yes
	Technology of engineering materials, M. Philip & W. Bolton, BH, 2002, London.	No
Websites		

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

(50 - 100)	**B -** Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required but credit awarded
	F – Fail	راسب	(0-44)	A 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	**Mechanical Drawing**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME206**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		ME	**College**		COE
Module Leader	Dr. Ahmed Khalid Ibrahim		**e-mail**	alnajar.ahmed9@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 52. To further knowledge of computer generated engineering drawing. 53. To create, edit and print a variety of technical drawings using a CAD system. 54. To develop comeptence with office applications to communicate and demontstrate professional knowledge. 55. Decide on strategies to be used and assumptions that need to be made. 56. Use both algebraic and geometric approaches in problem-solving. 57. Develop a flexible and creative problem-solving ability. 58. Develop an integrated understanding of the mechanical drawing. 59. Examine intermediate results or other quantities that could be used to ensure a solution is physically reasonable. 60. Develop their ability to communicate ideas of science. 61. Identify what they don't understand, and ask specific questions in order to gain understanding. 62. Develop an expertise in experimental methodologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	50. Study of detail drawings with dimensioning and tolerances, sectioning techniques, orthographic projection, and pictorial drawings. Topics covered include: Geometric Dimensioning and tolerance techniques, the dimensioning standard, pictorial drawings, auxiliary views, sections, fasteners, and the creation of assembly and detail drawings. 51. Prepare free-hand multiview sketches of objects assigned by the instructor. 52. Create and insert symbols. 53. Specify and depict threads, fasteners and other hardware in a mechanical assembly. 54. Plot assembly drawings with certan scales. 55. Design and document a consumer product (as defined by the instructor) that follows the classical design model (problem identification, ideation, analysis and refinement, decision and implementation) from conception through working drawings. 56. Solve a practical engineering problem using basic scientific knowledge. 57. Use IT skills and software to source information, write technical reports, and make presentations. 58. Read and construct engineering drawings to a high standard. 59. Plan and complete a project on time.

	60. Work effectively within a team to achieve a desired objective. 61. Use a range of basic metal fabrication tools. 62. Use a range of PCB assembly tools and basic test instruments. 63. Use an Integrated Development Environment for code generation for the PIC micro-controller. 64. Use Electronic CAD software to draw schematic diagrams. 65. Apply basic mechanical design principles. 66. Apply safe laboratory work practice.
Indicative Contents المحتويات الإرشادية	Study of detail drawings with dimensioning and tolerances, sectioning techniques, orthographic projection, and pictorial drawings. Topics covered include: Geometric Dimensioning and tolerance techniques, the dimensioning standard, pictorial drawings, auxiliary views, sections, fasteners, and the creation of assembly and detail drawings. Introduce students to the principals of mechanical drawing employing Computer-Aided-Drafting techniques.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Formative assessment	**Quizzes**	3	10% (10)	4, 9, 12	LO #1, 2, 10 and 11
	Assignments	7	15% (15)	2, 4, 6, 8, 10, 12, 14	LO # 3, 4, 6, 7, 9 and 12
	Projects / Lab.	1	5% (5)	9	LO # 5, 8, 10, 13, 15 and 17
	Report		0% (0)		
Summative assessment	**Midterm Exam**	1hr	20% (20)	8	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction; syllabus; lines, section, views, dimension and the students will draw a class work and take a home work.
Week 2	Permanent fastening; Permanent fastening is a hardware device that mechanically joins or affixes two or more objects together.
Week 3	Introduction to basic CAD concepts using AutoCAD. Basic file management techniques. se and identify key components of the software relating to the 2D drawing environment.
Week 4	Temporary fastening; Temporary fastening are any fastener that is considered to create a temporary joint. The biggest most common example is a hex cap screw and nuts.
Week 5	Use the AutoCAD software co-ordinate system to aid accurate drawing. Set up the drawing environment with the correct units in order to start producing drawings.
Week 6	Tolerances and Fit; Tolerances and Fit In mechanical engineering, limits and fits are a set of rules regarding the dimensions and tolerances of mating machined parts if they are to achieve the desired ease of assembly, and security after assembly - sliding fit, interference fit, rotating fit, non-sliding fit, loose fit, etc.
Week 7	se absolute/relative/polar X, Y co-ordinate system to produce basic measured objects through keyboard entry. Use AutoCAD function keys. Use hatch, text and simple dimensioning routines. Basic editing and drawing commands. Scale/load line types. Use a layering system and different line type styles and assign line weights.
Week 8	Couplings; Couplings are a device used to connect two shafts together at their ends for the purpose of transmitting power. Couplings do not normally allow disconnection of shafts during operation.
Week 9	Create/edit basic block. Create isometric drawings in 2D AutoCAD. Use of polar and circle array. Introduction to dynamic blocks. Enhancing CAD drawings with text, symbols and

	blocks. Transferring data using the Design Centre.
Week 10	Bearings; Bearings are a device used to connect two shafts together at their ends for the purpose of transmitting power. Couplings do not normally allow disconnection of shafts during operation.
Week 11	Create basic dimension styles to suit viewport scales. Adding and editing dimensions with different dimensioning styles. Create/edit basic .ctb files (colour dependant plots styles)
Week 12	Coupler joint; Coupler joint is the most commonly used form of pipe joint. it is formed but a small piece of pipe known as socket.
Week 13	Share data working with other applications Word and Excel. Using paper space to print a variety of drawing layouts to scale. Scan raster images and import them into AutoCAD.
Week 14	Assembly drawings; Assembly drawings can be used to represent items that consist of more than one component.
Week 15	Valve; A valve is a device that regulates, directs or controls the flow of a fluid by opening, closing, or partially obstructing various passageways and the students will draw a class work and take a home work.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	➢ **Engineering Drawing and Design,** David A. Madsen, 1989. ➢ **Mechanical Drawing Board & CAD Techniques, Student Edition,** McGraw-Hill Education, 1997.	Yes
Recommended Texts	➢ **Machine drawing,** R.K.DHAWAN. 2008.	No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language II**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM2022**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UG2	**Semester of Delivery**		3
Administering Department		ME	**College**	COE	
Module Leader	Mohanad Kamil Radhi		**e-mail**	Radhi83@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		14/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims and Learning Outcomes	Students will be able to: 63. Distinguish between dependent, Independent, and Integrated essays. 64. Find the topic and the thesis statement of short essays. 65. Identify the main ideas from the introduction paragraph. 66. Identify the main ideas from the body paragraph. 67. Find the supporting details from the introduction paragraph. 68. Find the supporting details from the body paragraph. 69. Draw an outline to link the ideas, supporting details, and essay topic. 70. Make notes in response to an essay question to create main ideas, supporting details, and thesis statement. 71. Write the introduction paragraph on basis of the thesis statement and main ideas. 72. Build the body paragraphs based on main ideas and supporting details. 73. Write the introduction paragraph based on the main ideas. 74. Enhance the smoothness and fluency of an essay by employing transition words and sentence starters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Classification of Essays:** [2 hrs] - Independent essays based on personal thoughts. - Dependent essays based on data, figures, diagrams. - Integrated essays **Structure of academic essays:** [6 hrs] - Analyzing academic essays according to the standard structure of academic essays. **Idea Maps:** [3 hrs] - Filling the idea maps from the major information extracted while reading an essay. **Responding to an essay question:** [4 hrs] - Building an outline using personal ideas in response to an essay question. **Writing Paragraphs:** [6 hrs] - Writing thesis statement. - The Introduction Paragraph.

	- The Body Paragraphs. **Essay Conclusion:** [3 hrs] - Writing the conclusion paragraph considering the main ideas stated in the introduction and body paragraphs **Transition words and connection phrases:** [3 hrs] **Dependent essays:** [3hrs] - Introduction to essays based on figures, tables, diagrams, and processes

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The approach to be followed here is to motivate students to analyze previously written model essays to understand the standard structure of academic essays then implement the same procedures to build their own essays.

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	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
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, 3, 8 and 10
	Assignments	2	10% (10)	3, 12	LO # 5, 6,11 and 12
	Projects / Lab.				
	Report	1	20% (20)	14	LO # 1-10
Summative assessment	**Midterm Exam**				
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of Academic Essays Independent, Dependent, and Integrated essays Structure of academic essays
Week 2	Structure of academic essays
Week 3	Topic sentence and thesis statement Identifying topic sentence and thesis statement of academic essays.
Week 4	Main Ideas: Identifying the main Ideas of academic essays.
Week 5	Supporting Details: Identifying the supporting details
Week 6	Essay outlines: Building Essay outlines using idea maps
Week 7	Essay Questions: Responding to essay questions by making personal notes
Week 8	Topic Sentence : Writing a thesis statement or topic sentence using personal thoughts.
Week 9	Personal Thoughts: Using personal thoughts to express main ideas and supporting details in response to an essay question.
Week 10	Idea Map Creation: Building an idea map of an essay question.
Week 11	Transition words and sentence starters Increasing the fluency, coherence, and smooth transition of thoughts using sentence starters and transition words.
Week 12	Writing the Introduction: Combining the thesis statement and main ideas together to build the introduction paragraph.
Week 13	Writing the Conclusion
Week 14	Introduction to dependent writing tasks
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ No Textbook is required for this course. Supplemental materials will be provided by provided by the instructor.	
Recommended Texts	➢ *Sharpe, P. J. (2009). Barron's TOEFL iBT. Barron's Educational Series.* ➢ *Lougheed, L. (2016). Barron's Ielts with Mp3 Cd. Barron's.*	No
Websites		

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

Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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.

LEVEL UGII
SEMESTER 4

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fluid Mechanics II**			**Module Delivery**	
Module Type	**C**			☒ **Theory**	
Module Code	**ME251**			☐ **Lecture**	
ECTS Credits	**4**			☐ **Lab**	
SWL (hr/sem)	**100**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	ME		**College**	COE	
Module Leader	Dr. Ahmed Khalid Ibrahim		**e-mail**	Alnajar.ahmed9@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval	01/06/2023		**Version Number**	1.0	

Date			

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	Students will be able to: 1. Write clear physical and mathematical arguments including effective use of fluid equations. 2. Develop a solid understanding of the fundamental principles of fluid. 3. Use graphs and diagrams to convey results. 4. Decide on strategies to be used and assumptions that need to be made. 5. Use both algebraic and geometric approaches in problem-solving. 6. Develop a flexible and creative problem-solving ability. 7. Develop an integrated understanding of the unity of fluid. 8. Develop their ability to communicate ideas of science. 9. Identify what they don't understand, and ask specific questions in order to gain understanding.

	10. Develop an expertise in experimental methodologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply impulse-momentum principles and applications. 2. Demonstrate an understanding of ideal fluid flow. 3. Describe similitude and dimensional analysis. 4. Understand of basic viscous flows. 5. Understand of momentum-integral methods. 6. Calculate friction losses in pipes.
Indicative Contents المحتويات الإرشادية	This course provides and deals with different types of liquids at different temperatures and conditions, in addition to study the different equations that govern these fluids in static and moving conditions. The course has different subjects and topics which make the student have the enough understanding in thermal power field. The way in which they react to applied forces, accelerations, and the shear and normal stresses and strains set up within the fluids are all considered in an attempt to provide sufficient knowledge to the students to be able to work and design different equipment in fluids field. The study of fluid mechanics is the study of the behavior of fluids (liquids and gasses) under static and dynamic conditions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

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	4.2
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	4.1

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	15% (15)	4, 12	LO #1, 2, 10 and 11
	Assignments	1	10% (10)	6	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report		0% (0)		
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction and review of the kinematics of the flow field.
Week 2	Impulse – momentum principles and applications.
Week 3	Impulse – momentum principles and applications.
Week 4	Propellers and impulse turbines.
Week 5	Propellers and impulse turbines.
Week 6	Pipe fittings.
Week 7	Pipe fittings.
Week 8	Similitude and dimensional analysis.
Week 9	Similitude and dimensional analysis.
Week 10	Flow of real fluids – basic concepts of external, internal, laminar and turbulent flow.
Week 11	Flow of real fluids – basic concepts of external, internal, laminar and turbulent flow.
Week 12	Definition of boundary layer.
Week 13	Definition of boundary layer.

Week 14	Friction losses in pipes.
Week 15	Lift and Drag.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ **Fluid Mechanics Fundamentals And Applications,** Çengel, Yunus A., 2006, Mcgraw-Hill Higher Education. ➢ **Fluid Mechanics,** Frank M. White., seventh edition, 2009, Mcgraw-Hill series in mechanical engineering.	Yes
Recommended Texts	➢ **Fluid Mechanics,** Russell Hibbeler. 2nd Edition, 2017.	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**

Success Group (50 - 100)	**A –** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C – Good	جيد	70 - 79	Sound work with notable errors.
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	**Thermodynamic II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME252**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	ME		**College**	COE	
Module Leader	Dr. Younis Najim		**e-mail**	mahalyounis@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 75. Introduce ME students to the second law of thermodynamics and provide them examples from real engineering applications. Identify valid processes as those that satisfy both the first and second laws of thermodynamics. Reversible and irreversible process. 76. Apply the second law of thermodynamics to cycles and cyclic devices starting from idealized Carnot cycle including Carnot heat engines, refrigerators, and heat pumps. 77. Determine the expressions for the thermal efficiencies and coefficients of performance for reversible heat engines, heat pumps, and refrigerators. 78. Define entropy to quantify the second-law effects. Establish the increase of entropy principle and how to calculate the entropy changes that take place during processes for pure substances, incompressible substances, and ideal gases. 79. Derive the reversible steady-flow work relations. Develop the isentropic efficiencies for various steady-flow devices. Introduce and apply the entropy balance to various systems. 80. Introduce gas power cycles for which the working fluid remains a gas throughout the entire cycle. Analyze both closed and open gas power cycles. Solve problems based on the Otto, 81. Diesel, Brayton cycle. Brayton cycle with regeneration; and the Brayton cycle with intercooling, reheating, and regeneration. 82. Analyze vapor power cycles in which the working fluid is alternately vaporized and condensed.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course students would be able to: 6. Understanding the Second Law of Thermodynamics: Students should be able to comprehend and explain the fundamental principles and concepts associated with the Second Law of Thermodynamics, such as entropy, irreversibility, and the direction of natural processes. 7. Knowledge of Reversible and Irreversible Processes: Students should be able to differentiate between reversible and irreversible processes, understand their characteristics, and analyze their implications in various thermodynamic systems. 8. Familiarity with Carnot Cycle and Thermal Efficiency: Students should gain

	an understanding of the Carnot cycle, a theoretical reversible heat engine, and be able to calculate its thermal efficiency. They should also be able to compare the Carnot cycle with real-world thermodynamic systems. 9. Competence in Entropy Calculation: Students should be able to calculate entropy changes for different states of matter, including solid, liquid, and ideal gases. They should also understand how entropy is related to temperature, heat transfer, and phase changes. 10. Understanding Isentropic Processes and Entropy Balance: Students should be able to analyze and calculate entropy changes in isentropic processes and understand the concept of entropy balance in various thermodynamic systems. 11. Proficiency in Exergy Analysis: Students should be able to apply exergy analysis to closed systems and control volumes, understanding the concept of exergy and its significance in assessing the usefulness of energy. 12. Knowledge of Power Cycles: Students should gain knowledge of different power cycles, such as the Otto cycle, Diesel cycle, and Brayton cycle. They should understand their thermodynamic processes, efficiency, and the factors influencing their performance. 13. Understanding Vapor Power Cycles: Students should comprehend the principles of vapor power cycles, such as the Rankine cycle, and its variations with superheat and reheat. They should be able to analyze the efficiency and performance of these cycles. 14. Introduction to Refrigeration Cycle: Students should gain an understanding of the basic principles of refrigeration cycles, including the concepts of heat transfer, compression, expansion, and the analysis of coefficient of performance (COP).
Indicative Contents المحتويات الإرشادية	Module Contents: **1. Introduction to the Second Law of Thermodynamic [8 hr]** - thermal energy - Kelvin–Planck statements - Clausius statement - Concepts of perpetual-motion machines **2. Reversible and Irreversible Process [8 hr]** - irreversible processes, - heat engines, - heat pumps and refrigerators - Temperature scale **3. Carnot Cycle and Thermal Efficiency [8 hr]** - Describe the Carnot cycle - Idealized Carnot heat engines, - Idealized Carnot Refrigerators, and heat pumps. **4. Introduction to Entropy [8 hr]** - Apply the second law of thermodynamics to processes - Principle of entropy increase - Entropy changes for pure substances, - Entropy changes for incompressible substances and solid - Entropy changes for and ideal gases

- Entropy change for ideal gas with variable specific heat

5. Entropy balance [8 hr]

- Isentropic processes
- Entropy balance and entropy change of systems
- Mechanism of entropy transfer
- Entropy generation
- Entropy balance of closed system
- Entropy balance of control volume

6. Isentropic Processes and Entropy balance [8 hr]

- Reversible steady flow work
- Minimizing the compressible work
- Isentropic efficiency of the steady flow device

7. Exergy and exergy balance of closed system [8 hr]

- Work potential of energy
- Exergy change of a system
- Mechanism of exergy transfer
- Exergy decrease and destruction
- Exergy balance of closed system

8. Exergy balance of control volume [8 hr]

- Exergy balance for steady flow system
- Second law efficiency of steady flow device

9. Gas power cycles [8 hr]

- Ideal power cycle and Carnot power cycle
- Air-standard cycle
- Otto cycle

10. Gas power cycles [8 hr]

- Diesel cycle
- Dual cycle
- Brayton cycle

11. Development of Brayton cycle [8 hr]

- Brayton cycle from idealized one
- Brayton cycle with Intercooling
- Brayton cycle with Reheating
- Brayton cycle with Regeneration

12. Vapor power cycles [8 hr]

- Carnot vapor cycle
- Ideal Rankine cycle
- Deviation of actual from idealized Rankine cycle

13. Rankine with superheat and reheat [8 hr]

- Actual steam power cycle
- Improvement of Rankine cycle
- Rankine cycle with superheat and reheat
- Regenerative Rankine cycle

14. Vapor and Combined Power Cycles [8 hr]

	- Energy analysis of simple combined power cycle **15. Introduction to Refrigeration cycle [8 hr]** - Reversed Carnot cycle - Ideal vapor compression cycle - Actual vapor compression cycle

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	4, 9, 12	LO #1-9
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 0
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the Second Law of Thermodynamic
Week 2	Reversible and Irreversible Process
Week 3	Carnot Cycle and Thermal Efficiency
Week 4	Introduction to Entropy.
Week 5	Entropy calculation for solid, liquid and Ideal gases
Week 6	Isentropic Processes and Entropy balance
Week 7	Exergy and exergy balance of closed system
Week 8	Exergy balance of control volume
Week 9	Power cycles, Otto cycle,
Week 10	Diesel and Dual Cycle
Week 11	Brayton cycles. Brayton cycle with intercooling, reheating, and regeneration.
Week 12	Vapor power cycles
Week 13	Rankine with superheat and reheat
Week 14	Vapor and Combined Power Cycles
Week 15	Introduction to Refrigeration cycle
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	2. Yunus A. Cengel and Michael A. Boles. Thermodynamics:	Yes

	An Engineering Approach, 7th Ed. McGraw Hill, 2011.	
Recommended Texts	3. Borgnakke, C. and Sonntag, R. E., Fundamentals of Thermodynamics, 7th Ed., John Wiley & Sons, 2009. 4. Moran, M.J., and Shapiro, H.N., Fundamental of Engineering Thermodynamics, 5th Ed., John Wiley &	PDF
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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Mechanics of Materials II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME253**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		ME	**College**	COE	
Module Leader	Ziad Shakeeb Al Sarraf		**e-mail**	ziadalsarraf@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		07/06/2023	**Version Number**	1.0	

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

Module Aims, Learning Outcomes, and Indicative Contents

Module Aims	1. To calculate stresses, strains, shear stresses, shear strains, and deformations of objects under external loadings. 2. To increase the knowledge of the strength of materials in engineering design and their applications. 3. To build the necessary theoretical background for further structural analysis and design courses.
Module Learning Outcomes	1. An ability to apply science and engineering knowledge in Mechanics of Materials (strength of materials) fields. 2. Understanding the relationships between loads, internal pressure and deformations, and material stresses and strains in thin and thick vessels. 3. An ability to design a system, component, or process to meet desired needs within realistic constraints. 4. An ability to identify and solves engineering mechanics problems. 5. Understanding the principle of failure theories for structural members subjected to combined loadings.
Indicative Contents	Indicative content includes the following. **Thin Cylinders and Shells:** [20 hr] Thin cylinders under internal pressure; Hoop or circumferential stress; Longitudinal stress; Changes in dimensions; Thin rotating ring or cylinder; Thin spherical shell under internal pressure; Change in internal volume; Vessels subjected to fluid pressure; Cylindrical vessel with hemispherical end; Effects of end plates and joints; Problems. **Thick Cylinders :** [15 hr] Introduction; Difference in treatment between thin and thick cylinders, Development of the Lame theory, Thick cylinder - internal pressure only, Longitudinal stress, Change of cylinder dimensions, Change of diameter and Change in length, **Complex Stresses:** [15 hr] Material subjected to pure shear; Material subjected to combined direct and shear stresses; Principal plane inclination in terms of the associated principal stresses. **Complex Strain and the Elastic Strain:** [25 hr] Introduction; Application of Mohr's circle to combined loadings, Mohr's circle for strains. Euler's formula for long columns. **Buckling of columns:** [15 hr] **Theories of elastic failure.** [20 hr] **Stress analysis Applications by computer.** [15 hr] Using stress analysis software to solve simple and intermediate problems

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	100		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	4, 9, 12	LO #1, 2, 4 and 5
	Assignments	4	15% (15)	2, 12	LO # 3, 4, and 5
	Projects / Lab.		0% (0)		
	Report	1	0% (0)		
Summative assessment	**Midterm Exam**	1hr	20% (20)	8	LO # 1-3
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Thin cylindrical and spherical vessels (1)
Week 2	Thin cylindrical and spherical vessels (2)
Week 3	Thick cylindrical and spherical vessels (1)
Week 4	Thick cylindrical and spherical vessels (2)

Week 5	Complex stresses (1)
Week 6	Complex stresses (2)
Week 7	Complex strains (1)
Week 8	Complex strains (2)
Week 9	Buckling of columns (1)
Week 10	Buckling of columns (2)
Week 11	Flanged bolt couplings
Week 12	Theories of elastic failure (1)
Week 13	Theories of elastic failure (2)
Week 14	Stress analysis Applications by computer (1)
Week 15	Stress analysis Applications by computer (2)
Week 16	**The final exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	▪ . J. Hearn. "Mechanics of Materials 1: (Strength of Materials), An Introduction to elastic and plastic deformation of solids and structural materials ", 3rd, 2010.	Yes
Recommended Texts	▪ R. C. Hibbeler. "Strength of Materials". 12th edition or any new edition 2012. (Can be downloaded from the Course web page).	Yes
Websites		

Grading Scheme				
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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics III**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME254**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Muyassar Edris Ismaeel		**e-mail**	Muyassar.alhasso@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Mr. Marwan F. Basheer		**e-mail**	marwanfakhry@uomosul.edu.iq	
Peer Reviewer Name		Mrs. Eman M. Ali	**e-mail**	emanmali@uomosul.edu.iq	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics II (ME152)	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	By enrolling in the Engineering Mathematics course, students will acquire the essential skills and knowledge needed to effectively solve simple engineering problems using mathematical techniques
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this module, students will be able to: 1. Describe the functions of multiple variables, identify their range, and describe vector quantities, Fourier series, and the Laplace transform. 2. Apply the basic concepts of differentiation and integration to multivariable functions, as well as find the coefficients of the Fourier series and perform Laplace transformations. 3. Classify the critical points for functions of several variables and distinguish between the types of Fourier series, namely the Fourier sine and cosine series. 4. Skillfully communicate orally in groups of specialist people and demonstrate strong written communication skills across various managerial levels. 5. Perceive ethical and professional responsibilities in solving engineering problems using Engineering Mathematics. 6. Improve their ability to communicate scientific ideas and solve engineering problems mathematically. 7. Work adequately in teams and to set up objectives, plan activities, meet due dates, and manage risks and uncertainty.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Vectors and the Geometry of Space:** [20 hrs.] - Introduction to the three-dimensional coordinate systems. - Represent vectors quantities in the plane or in space. - Perform the dot product and cross product. - Write equations for lines and planes in space using scalar and vector products. **Introduction to Multivariable Functions:** [10 hrs.] - Introduction to functions of several variables. - Determine the domains and ranges of multivariable functions. - Draw the graphs, level curves, and contours of functions of two variables. - Determine the limits & continuity of multivariable functions.

	Partial Derivatives: [30 hrs.] - Find the partial derivatives of a function of two variables. - Second-order partial derivatives. - Partial derivatives of higher order. - The chain Rule. - Implicit differentiation. - Applications of partial derivatives (extreme values and saddle points) **Multiple Integrals:** [25 hrs.] - Double and iterated integrals over rectangles. - Double integrals over general regions. - Calculate an area using the double integration. - Calculate the average value of a function of two variables. - Evaluate the double integrals in polar form. - Triple integrals in rectangular coordinates. - Calculate the average value of a function of triple variables. - Triple integrals in cylindrical - Applications of multiple integrals (masses, center of mass, and moments of inertia). **Fourier Analysis:** [15 hrs.] - Introduction to Fourier series - Trigonometric form of Fourier series - Arbitrary period, even and odd functions, and half-range expansions. **Ordinary and Partial Differential Equation:** [50 hrs.] - Classification of differential equations - Solution of differential equations (General and Particular Solutions). - Introduce the First order ordinary DEs (Linear). - First order ordinary DEs (separable homogeneous) - First order ordinary DEs (exact, non-homogeneous) - Second order ordinary DEs (Linear Second order DEs with constant coefficients) - Second order ordinary DEs (Undetermined coefficient method) - Second order ordinary DEs (Variable of parameter method, Second order DEs with variable coefficients) - Application of second order ordinary differential equations **Laplace transform:** [50 hrs.] - Laplace transform properties and application. - Laplace Inverse Transform and Laplace transform of unite step function. - Laplace Inverse Transform of unit step function. - First Shifting theorem (Translation in S- domain). - Second Shifting theorem (Translation in Time) Convolution Theorem. - Solution of Differential Equations by Laplace Transformation.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes and interactive tutorials.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	10% (10)	3,5, 9, 11,13	LO #1, 2 and 3
	Assignments	4	10% (10)	2, 6, 10, 12	LO # 2, 3, 4 and 5
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 2, 3, 4 and 5
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	All
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Vectors and the Geometry of Space
Week 2	Vectors and the Geometry of Space
Week 3	Introduction to Multivariable Functions
Week 4	Partial Derivatives
Week 5	Partial Derivatives
Week 6	Multiple Integrals
Week 7	Multiple Integrals
Week 8	Fourier Analysis
Week 9	Ordinary and Partial Differential Equation
Week 10	Ordinary and Partial Differential Equation
Week 11	Ordinary and Partial Differential Equation
Week 12	Ordinary and Partial Differential Equation
Week 13	Laplace transform
Week 14	Laplace transform
Week 15	Laplace transform
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	➢ Weir, M.D., Hass, J., Heil, C. and Thomas, G.B., 2014. Thomas' Calculus: Single Variable: Based on the Original Work by George B. Thomas, Jr. Pearson.	Yes

	➢ Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2011.	Yes
Recommended Texts	Advanced Engineering Mathematics, DIFFERENTIAL EQUATIONS with Boundary-Value Problems a Zill Cullen-Zill-6rd-Edition-Solutions, 2018.	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**UOM2032**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		ME	**College**		COE
Module Leader	Eman Mohammed Ali		**e-mail**		emanmali@uomosul.edu.iq
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor	Name (if available)		**e-mail**		E-mail
Peer Reviewer Name		Name	**e-mail**		E-mail
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	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	Students will be able to: 83. Use MATLAB to display data and equations graphically or in tabular form. 84. Write and execute MATLAB script files to solve math, science, and engineering-related problems. 85. Use loops, selection structures, and input/output commands in MATLAB. 86. Model data in MATLAB by curve-fitting with polynomials and by using interpolation. 87. Use MATLAB to solve a system of simultaneous equations, to find roots of polynomials, and to solve other single-variable equations. 88. Perform numerical integration and differentiation using MATLAB. 89. Implement engineering algorithms and techniques for system analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By successfully completing this course, students shall be able to: 8. Write MATLAB programs to solve engineering problems. 9. Utilize control structures (if-else statements, loops) to implement algorithms and logic. 10. Implement engineering algorithms and techniques for system analysis. 11. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. 12. Use MATLAB for optimization and design of engineering systems. 13. Understand and interpret MATLAB program results in the context of engineering applications. 14. Generated plots and visualizations to represent engineering data effectively. 15. Use MATLAB-Simulink for modeling and simulation of an engineering systems
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Programming in MATLAB:** [25 hrs] - M-File scripts - M-File functions - Inputs to script files - Outputs commands **Control flow and operators:** [25 hrs] - The “if…….end” structure - The “for ….. end” loop - The “while…..end” loop

	- Operator precedence **Mathematical computing with MATLAB:** [25 hrs] - Algebraic equations - Basic symbolic calculus and differential equations - Numerical techniques and transforms **Debugging M-File:** [25 hrs] - Preparing for debugging - Setting breakpoints - Running with breaking points - Examining value - Correcting and ending debugging - Correcting an M-File **Introduction to Simulink with engineering applications:** [25 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, And the implementation of the programs explained in the theoretical lectures, in addition to motivating the student to write codes inside the laboratory

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	10% (10)	3,5,6,9,12	LO #2,4,5,6 and 8
	Assignments	5	10% (10)	2,4,7,10,13	LO #2,4,5,6 and 8
	Projects / Lab.		10% (10)	all	all
	Report		0% ()		
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	8	LO # 1-4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	MATLAB interface, user input and output, variables, operators
Week 2	Programming in MATLAB: M-file scripts
Week 3	Programming in MATLAB: M-file functions
Week 4	Programming in MATLAB: Inputs to script files and outputs commands
Week 5	Flow control: If-statement
Week 6	Flow control: While loops, break, continue
Week 7	Flow control: For-loops
Week 8	Functions, data analysis and plotting
Week 9	Mathematical computing with MATLAB: Algebraic equations
Week 10	Mathematical computing with MATLAB: Basic symbolic calculus and differential equations
Week 11	Mathematical computing with MATLAB: Numerical techniques and transforms

Week 12	Debugging M-File: Preparing for debugging, setting breakpoints, Running with breaking points, Examining value, Correcting and ending debugging, Correcting an M-File
Week 13	Introduction to Simulink with Engineering applications
Week 14	Introduction to Simulink with Engineering applications
Week 15	Introduction to Simulink with Engineering applications
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-14	Practical application.
Week 15	Practical exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Stormy Attaway, "A Practical Introduction to Programming and Problem Solving", August 6, 2016, 4 th Edition, ISBN-13: 978-0128045251	No
Recommended Texts		
Websites		

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

Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Mechanical Engineering Laboratory I**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME256**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		ME	**College**	COE	
Module Leader	Ali G. Mohammed		**e-mail**	aligm@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		None	**e-mail**	None	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes, and Indicative Contents	
Module Aims	90. To apply knowledge of mathematics, science, and engineering 91. To design and conduct experiments, as well as to analyze and interpret data

	92. To identify, formulate, and solve engineering problems 93. To communicate effectively as teamwork. 94. Recognition ability to engage in life-long learning 95. To use the techniques, skills, and modern engineering tools necessary for engineering practice
Module Learning Outcomes	Upon successful completion of this course, students will be able to 19. Learn how to gain knowledge by looking at reality, not an attempt to make reality conform to preconceptions. The important thing is to learn how to be observant, to see what happens, and to deal with this information with the strictest integrity. And to understand, or learn to understand, the meaning of what happens. 20. Provide an experimental foundation for the theoretical concepts introduced in the lectures. Students have an opportunity to verify some of the ideas for themselves. 21. To familiarize students with experimental apparatus and the scientific method so that they will have some idea of the inductive process by which the ideas originated. To teach how to make careful experimental observations and how to think about and draw conclusions from such data. 22. To learn how to write a technical report communicating scientific information clearly and concisely. 23. Understand the physical concept of different mechanical experiments.
Indicative Contents	Indicative content includes the following. <u>Part A – Applied mechanics experiments</u> [15 hrs] - - . <u>Part B – Production and metallurgy experiments</u> [20 hrs] - - . <u>Part C – Thermal systems experiments</u> [20 hrs] - - . <u>Part D – Fluid mechanics experiments</u> [20 hrs] - - .

Learning and Teaching Strategies	
Strategies	This course aims to enrich students' knowledge about various mechanical engineering experiments, including mechanical tests of metals and thermal and fluid mechanic behavior of systems. Thus, the primary strategy of this curse is to encourage students to refine their thinking skills by experiencing many stages of designing a process, planning and carrying out experiments, and eventually reporting the results orally and in a team environment. This strategy is achieved through hands-on different lab experiments, interactive discussions, and writing technical reports.

Student Workload (SWL)			
Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	27	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	75		

Module Evaluation					
		Time/No	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	8% (8)	4, 7,10,14	LO #1, 2, 3 and 5
	Assignments	4	8% (8)	4, 7,10,14	LO # 2, 4, and 5
	Projects / Lab.		0% (0)		
	Report	12	24% (24)	13	LO # 2, 3, 4and 5
Summative assessment	**Midterm Exam**	1 hr	10% (10)	9	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Materials are covered in related modules
Week 2	

Delivery Plan (Weekly Lab. Syllabus)

Week	Material Covered
Week 1	Tensile Test
Week 2	Hardness Test
Week 3	Universal Beam
Week 4	Moment of Inertia of Flywheel
Week 5	Adiabatic Index
Week 6	Rope-belt Friction
Week 7	Engine Model
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	
Week 16	**The final exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts		Yes

Recommended Texts		Yes
		No
Websites		

Grading Scheme				
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 is required but credit awarded
	F – Fail	راسب	(0-44)	A 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.

MECHANICAL ENGINEERING

MODULE DESCRIPTION FORM

LEVEL UGIII

SEMESTER 5 and 6

SEMESTER 5	
ME301	Theory of Machines
ME302	Conductive Heat Transfer
ME303	Manufacturing Processes II
ME304	Combustion and Pollution
ME305	Gas Dynamics
ME306	Non-Destructive Testing
ME307	Mechanical Considerations
SEMESTER 6	
ME351	Machine Element Design
ME352	Convective and Radiative Heat Transfer
ME353	Numerical Analysis
ME354	Engineering Management and Economics
ME355	Internal Combustion Engines
ME356	Mechanical Engineering Laboratory II
ME357	Applied Chemistry
ME358	Engineering Project ,Design and Planning

MODULE DESCRIPTION FORM

Module Information					
Module Title	Theory of Machines			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ME301				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	**3**		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Abdulhaqq A. Hamid		**e-mail**	abdulhaqghamid@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Mr. Yosuf Salim Mahmood		**e-mail**	Yousif.alhadidi@uomosul.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/09/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes, and Indicative Contents	
Module Aims	7. To present essential concepts of engineering mechanics, including displacement, velocity, acceleration, and relative motion. 8. To Analyze the position, velocity, and acceleration in machines and mechanisms using graphical, analytical, and vector methods. 9. To Understand the principles of balancing for rotating and reciprocating masses 10. To Study the concepts of friction, wear, and their applications in engineering systems like clutches and brakes 11. To Analyze the operation of flywheels and mechanical governors. 12. To define and analyze gears, cams, and universal joints.
Module Learning Outcomes	After completion of the course, the student should be able to: 8. Gain a clear knowledge of mechanisms and machines. 9. Demonstrate the ability to draw kinematic diagrams of actual mechanisms and determine their mobility. 10. Possess the capability to determine the position, velocities, and accelerations (both linear and angular) of various points and links in mechanisms using analytical, graphical, and vector methods. 11. illustrate a basic understanding of balancing different types of machiner. 12. Gain complete knowledge of wear, friction, and their engineering applications in belt drives, clutches, and brakes, along with a complete analysis of static and dynamic forces. 13. Analyze and design mechanical governors for a machine. 14. Discuss the effect of crank effort and flywheels, and perform a complete analysis to determine required forces and masses. 15. Identify the gyroscope motion, couple, and their applications. 16. Demonstrate complete knowledge of gears and gear trains, including their types and methods of analysis. 17. Be familiar with universal joints, including their types and methods of analysis. 18. Use techniques, skills, and modern engineering tools necessary for engineering practice, such as 2D and 3D software like SolidWorks and Invento.
Indicative Contents	Indicative content includes the following. **Introduction to Theory of Machine:** [12 hrs] - Definitions, basic concepts, simple mechanisms and machines, and a review of engineering mechanics. **Position, Velocity, and Acceleration Analysis in Machines and Mechanisms :** [60 hrs]

	- Introduction, coordinate systems, and methods for determination of positions (Graphical, Analytical and Vector loop methods) - Introduction, absolute and relative velocity, velocity of a point on the link, velocity of sliding block on a rotating link, and methods for determination of velocities (Relative velocity diagram, analytical or algebraic and instantaneous center methods) - Introduction, methods for determination of accelerations (Acceleration diagram Method, acceleration of block sliding on a rotating link), and analytical or algebraic methods for determination of accelerations. **Balancing of Rotating and Reciprocating Masses:** [24 hrs] - Introduction, static and dynamic balance, balancing of rotating masses in the same and different planes, and graphical and analytical methods. - Introduction, and methods for solving problems of Reciprocating Masses **Friction and Wear:** [12 hrs] - Introduction to tribology, types of wear and friction, and their engineering applications. **Clutches and Brakes Systems:** [12 hrs] - Introduction, principle of clutches, types (positive and friction), and different types of friction clutches (Plate or Disc, Cone, Centrifugal). - Introduction, types of Brakes Systems, application in machines, and method of analysis **Belts, Ropes, and Chain Drives:** [12 hrs] - Introduction, definitions, types (Flat, Rope, and V-Belts), force analysis, power transmitted, efficiency, and slips. **Gyroscopes** [18 hrs] - Gyroscope motion, couple analysis, and applications in ships and airplanes. **Governors** [12 hrs] - Introduction, types of governors (Dead Weight and Spring loaded), and complete force analysis. **Turning Moment Diagrams and Flywheels** [12 hrs] - Introduction, definitions, crank effort diagrams, fluctuation of speed, and fluctuation of energy. **Tooth Gears** [12 hrs] - T Introduction, types of gears, applications, and force analysis in spur gears. **Cams** [12 hrs] - Introduction, types of desired motion, and method of analysis and designing of cams.

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module is to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials.

Student Workload (SWL)			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	82	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	175		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	)24% (24	, 128, 3	LO #1
	Assignments	3	)8% (8	11, 7,2	LO # 1
	Projects / Lab.		0% (0)		
	Report	1	)8% (8	13	LO # 7
Summative assessment	**Midterm Exam**	1hr	10% (10)	10	LO # 1
	Final Exam	3hr	50% (50)	16	LO # 1
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	introduction to Theory of Machines and Fast Review of Related Topics.
Week 2	Position Analysis in Machines and Mechanisms.
Week 3	Velocity Analysis in Machines and Mechanisms
Week 4-5	Acceleration Analysis in Machines and Mechanisms (1)
Week 4-5	Acceleration Analysis in Machines and Mechanisms (2)
Week 6-8	Balancing of Rotating Masses
Week 9	Balancing of Reciprocating Masses
Week 10	Friction and Wear
Week 11	Clutches and Brakes Systems
Week 12	Belts, Ropes, and Chain Drives
Week 13	Gyroscopes and Governors
Week 14	Turning Moment Diagrams, Flywheels and Tooth Gears
Week 15	**Final exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	• Mechanics of Machines, (Elementary and Examples), by: J. Hannah and R. C. Stephens, all editions, 1984, 2017, • Mechanics of Machines, (Advanced and Examples), by: J. Hannah and R. C. Stephens, all editions, 1984, 2017,	yes
Recommended Texts	• Theory of Machines, by Robert L. Norton, all editions. • Theory of Machines, by: R. S. Khurmi and J. K. Gupta, First-Edition 2010.	Yes

Websites	https://classroom.google.com/c/ODA5NzIwNjI3ODg5 (Class code : nbomgi4h)

Grading Scheme				
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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	**Conductive Heat Transfer**			**Module Delivery**	
Module Type	**Corse**			• ☒ **Theory** • ☐ **Lecture** • ☐ **Lab** • ☒ **Tutorial** • ☐ **Practical** • ☐ **Seminar**	
Module Code	**ME302**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Maan S. Mohammed Al Dabbagh		**e-mail**	maandabbagh@uomosul.edu.iq	
Module Leader's Acad. Title	Ass. Prof.		**Module Leader's Qualification**	M.Sc	
Module Tutor	Name (if available)		**e-mail**	maandabbagh@uomosul,edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	2025-2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Thermodynamics II (ME252)	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims **أهداف المادة الدراسية**	Students will be able to: 1. Write clear the objectives of this integrated subject 2. Develop the fundamental principles and laws of heat transfer and to explore the implications of these principles for system behavior including: formulate the models necessary to study 3. an ability to heat concepts mathematically, Enable the student to know the modes of heat transfer and a functional understanding of how these ideas play out in the real world. 4. analyze and design heat transfer systems through the application of these principles 5. Use graphs diagrams to convey results and Enable the student to know

	theoretical and practical concepts of the physics materials properties and heat effect on it. 6. develop the problem-solving skills essential to good engineering practice of heat transfer in real-world applications and Enable the student to know the heat transfer from the fluid to the wall surface 7. This course is an introduction to the principal concepts and methods of heat transfer. The objectives of this integrated 8. subject are to develop the fundamental principles and laws of heat transfer and to explore the implications of these principles for system behavior; to formulate the models necessary to study, analyze and design heat transfer systems through the application of these principles; to develop the problem-solving skills essential to good engineering practice of heat transfer in real-world applications 9. Decide on strategies to be used and assumptions that need to be made. 10. Develop a flexible and creative problem-solving ability. 11. Translate physical descriptions into mathematical equations. 12. Examine intermediate results or other quantities that could be used to ensure a solution.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1. The modes of heat transfer 2. Explain the convection and radiation heat transfer. 3. equips students with the theoretical frameworks and analytical skills to calculate, model, and evaluate heat transfer by fluid motion and electromagnetic waves. 4. It emphasizes real-world applications in thermal energy systems, energy-efficient building design, and industrial heat exchangers Insulation and thermal resistance value, the overall heat transfer coefficient , 5. Define Newton's Law of Cooling, defines the rate of convective heat transfer as being proportional to the temperature difference between a surface and the surrounding fluid 6. Explain, and apply Newton’s laws of cooling . 7. Understand fundamentals of energy, Understand the physical mechanisms of boundary layers, fluid dynamics, and the transition between laminar and turbulent flow. 8. Understand and apply the basic idea of heat transfer theorem to physical systems and Apply key dimensionless numbers—such as Nusselt (Nu), Reynolds (Re), Grashof (Gr), and Prandtl (Pr) numbers—to scale and solve fluid flow problems. 9. Compute convective heat transfer coefficients (h) for both forced and natural convection across various geometries (e.g., flat plates, cylinders, and pipes) 10. Study the behavior of temperature distribution in the plane wall, radial systems with no heat generation. 11. Comprehend the electromagnetic spectrum of thermal radiation and apply the Stefan-Boltzmann law to compute radiant heat emission. The mathematical models of the physical systems are explained 12. Differentiate between "blackbody" idealized surfaces and real "gray" surfaces using parameters like emissivity (epsilon), absorptivity, reflectivity, and

	transmissivity 13. Calculate radiation heat exchange between surfaces using view factors and analyze radiation shields. 14. Apply convective and radiative principles to design and analyze the performance of thermal systems, such as industrial heat exchangers, heat sinks, and solar collectors. 15. Utilize numerical methods (e.g., finite difference) or industry-standard computational tools to simulate combined heat transfer phenomena.
Indicative Contents **المحتويات الإرشادية**	• Indicative content includes the following. • convection relies on fluid movement, radiation transfers heat through electromagnetic waves and can occur in a vacuum: [10 hrs] • The advantage of developing the students ability to understand Convection is the transfer of heat through the macroscopic movement of fluids (liquids or gases) • Know the types of convection (forced , natural) • Know the heat transfer effect on fluid (liquid , gas) • Fluid movement driven by buoyancy forces arising from density changes due to temperature variations (e.g., warmer, less dense fluid rises) by natural convection. • Fluid movement is artificially induced by external mechanisms like pumps, fans, or blowers by forced convection. • How can be calculate the heat lost and gain from or by the system. • How can be calculate the heat using Newton's Law of cooling. • Newton's laws and it is applications: [10 hrs] • State, explain, and apply Newton's laws of cooling. • Newton's laws of motion are the foundational principles of classical mechanics. They explain how forces interact with objects to cause, change, or prevent movement in our daily lives How can calculate the overall heat transfer coefficient. • Solve problems using Newton's law of cooling • Heat transfer by forced convection: [15 hrs] • What is the forced convection • what is a mechanism of the forced convection, where fluid motion (such as air or water) is driven by external devices like fans, pumps, or blowers. It drastically accelerates heat transfer as rapid fluid movement continuously replaces boundary layers with fresh, hotter, or cooler fluid • Explain the classification of forced convection • The fluid flows over an unconfined, exterior surface said as external forced convection • The fluid is completely enclosed and forced to flow through a channel, pipe, or conduit defined as internal forced convection . • The cross flow forced convention • Additional Classifications which depending on the fluid's speed and path, internal and external flows are divided into two main flow regimes • **Laminar Flow:** Fluid particles move in smooth, parallel, and orderly layers. This

	occurs at lower velocities. • **Turbulent Flow:** Fluid particles mix rapidly and chaotically, creating vortices. This highly disordered motion significantly increases the heat transfer coefficient • Calculate the Reynold's number , Nusselt number, heat transfer coefficient, the rate of heat transfer. • Heat transfer by natural convection [10hrs] • Explain the natural convection process and the fluid motion is driven entirely by buoyancy forces caused by density differences, rather than by mechanical devices like pumps or fans. When a fluid is heated, it expands, becomes less dense, and rises, while cooler, denser fluid sinks to replace it, creating continuous circulation • Thermal radiation is the emission of electromagnetic waves (including infrared and visible light) generated by the thermal motion of charged particles in matter. [10hrs] • Radiation medium, **No Medium Required:** Unlike convection, radiation does not require a physical medium and can efficiently transfer heat through empty space • Explain the concept of **Blackbody Radiation:** An idealized physical body that absorbs all incident electromagnetic radiation and emits the maximum possible thermal radiation at a given temperature. • Calculate the heat transfer by radiation using the Stefan-Boltzmann Law

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	48	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	3.2
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	52	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	3.5
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	4, 9, 12	LO #1, 2, 10 and 11
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction , Principle of convection, laminar and turbulent boundary layer,
Week 2	Forced convection over flat plate ,laminar and turbulent
Week 3	Laminar and Turbulent flow in pipe and ducts
Week 4	Solved problems chapter No.5 Homework 1 Quiz
Week 5	Flow across cylinder, flow across Tube Bundles
Week 6	Solved problems chapter No.5 Homework2 Quiz
Week 7	Natural convection over surfaces
Week 8	Solved problems chapter No.6 Homework 3 Quiz
Week 9	1st term Examination
Week 10	Heat exchangers, types of heat exchangers , overall heat transfer coefficient, fouling factor, the log mean temperature difference method
Week 11	Solved problems chapter No. 10 Homework 4 Quiz
Week 12	The performance analysis of heat exchangers and design consideration
Week 13	Solved problems chapter No.10 Homework 5 Quiz
Week 14	Radiation heat transfer , radiation properties, black body radiation.
Week 15	Shape factor, relation between shape factor. Heat transfer between black and gray surfaces.
Week 16	Solved examples and problems
	Final exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Heat transfer , tenth edition(2010) , J.P. Holman , McGRAW hill international edition	Yes
Recommended Texts	Fundamental of HEAT and MASS transfer, Seventh Edition, Theodre L. Bergman, Adrienne S, Lavine, Frank P. Incropera, David P. Dewitt John Wiley & Sons, 2011	No
Websites		

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

ASS. Professor

Maan S. M. AL- Dabbagh

MODULE DESCRIPTION FORM

Module Information					
Module Title	Manufacturing Processes II			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ME303				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	3		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Mohammed Najeeb Abdullah		**e-mail**	moh_77@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	**The module aims to achieve the following objectives**: 1- Students will learn to analyze and evaluate various manufacturing processes in terms of their capabilities, limitations, and suitability for different applications.

	2- Students will explore the working principles, tooling requirements, process parameters, and applications of advanced machining processes 3- Students will understand the unique characteristics, advantages, and limitations of non-traditional machining processes. 4- They will learn about different welding techniques, joint design considerations, and the factors influencing the selection of joining processes. 5- Students will gain knowledge of the working principles, tooling requirements, process parameters, and applications of forming processes. 6- Students will explore the integration of computer-aided design (CAD) and computer-aided manufacturing (CAM) systems. 7- They will learn how to generate tool paths, optimize machining processes, and simulate manufacturing operations using CAM software.
Module Learning Outcomes	1. students will learn how to design and manufacturing materials. 2. Student should be able to understand various manufacturing metal forming processes 3. Student will be able to design of die for metal forming for any forming processes. 4. Student should be able to understand to select proper Advanced Manufacturing process for welding, casting and forging 5. Student will be able to choose welding machine for welding metal. **6.** Student will be able to explain principle and applications of non-traditional machining processes.
Indicative Contents	Indicative content includes the following. **Part A – BASIC METAL FORMING PROCESSES AND USES [5 hrs]** - Introduction - Advantages of Mechanical Working Processes - Difference Between Hot and Cold Working - Advantages and Disadvantages of Cold and Hot Working Processes - Classification of Metal Forming Processes According to Type of Stress Employed **Forging Processes:** [5 hrs] - Introduction - Classification of Forging - Open Die Forging - Closed Die Forging - Forging Presses - Machine Forging - Forging Defects **EXTRUSION, WIRE DRAWING, TUBE DRAWING**: [10 hrs] - Extrusion Processes - Machines for Extrusion - Extrusion Defects - Wire Drawing - Tube Drawing **Rolling Operation:** [5 hrs]

	Analysis of Flat Rolling, Neutral point. **Part B – Welding and Casting Processes.** **Arc and Resistance Welding:** [10 hrs] - Submerged Arc Welding, - Plasma Arc Welding, - Thermite welding, - Friction welding **Casting Processes:** [10 hrs] - Sand casting, - Shell moulding, - Investment casting - Permanent mould casting, - Centifugal casting - Die design and casting defects **Part C – Numerical Control(NC) and Non-traditional Machining Processes** **NC and CNC machines.** [10hrs] - Analysis of NC Positioning Systems, - NC Part Programming. - Application of NC) **Non-traditional Machining Processes:** [10 hrs] - Electric Discharge Machining (EDM), Wire Cut. - Electrochemical Machining Processes, - Ultrasonic Machining

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5.2
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	4.8
Total SWL (h/sem)			150

Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	3, 7, 12	LO #1, 2, and 5
	Assignments	4	5% (5)	2, 12	LO # 3, 4, and 6
	Projects / Lab.		10% (10)		
	Report	1	5% (5)	9	LO # 3 and 5
Summative assessment	Midterm Exam	1hr	20% (15)	8	LO # 1-4
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Metal Forming types, Material behavior, Flow stress at different temperatures.
Week 2	Rolling Operation, Analysis of Flat Rolling
Week 3	Forging, Open –Die Forging,
Week 4	Extrusion Process, Analysis of Extrusion
Week 5	Wires and bars drawing. Analysis of drawing process
Week 6	Welding processes: Arc, Submerged Arc ,Plasma Arc Welding
Week 7	Welding Processes: TIG-Welding, MIG-Welding
Week 8	Welding process: Friction welding, Electrical Resistance welding
Week 9	Sand casting, Shell moulding, Investment casting
Week 10	Permanent mould casting,Centifugal casting
Week 11	Die design and casting defects
Week 12	NC and CNC machines
Week 13	Applications of CNC, CAD/CAM
Week 14	Non-traditional machining (1)
Week 15	**Non-traditional machining (2)**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab: Introduction to Manufacturing Processes II Lab Safety Guidelines and Equipment Familiarization
Week 2	Lab: There are no laboratory experiments.
Week 3	Lab: Forming Processes Demonstration and Hands-on Practice of Hydroforming
Week 4	Lab: Forming Processes Continued
Week 5	Lab: Forming Processes Continued
Week 6	Lab: Forming Processes Continued
Week 7	Lab: There are no laboratory experiments.
Week 8	Lab: Joining Processes Demonstration and Hands-on Practice of Welding Techniques
Week 9	Lab: casting Processes
Week 10	Lab: casting Processes Continued
Week 11	Lab: Non-Traditional Machining Processes Continued Demonstration and Hands-on Practice of Electrical Discharge Machining (EDM)
Week 12	Lab: There are no laboratory experiments
Week 13	Lab: Non-Traditional Machining Processes Continued (3D printer)
Week 14	Lab: There are no laboratory experiments
Week 15	Lab: There are no laboratory experiments

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Mikell P.Groover. "FUNDAMENTALS OF MODREN MANUFACTURING _ MATERIAL PROCESSES AND SYSTEM". John Wiley and Sous. 2002.	No

Recommended Texts	B.H. Amsted, Philip F. Ostward and Myron L.' MANUFACTURING PROCESSES' Begman Jhon Willey Sons-Inc 2005.	No
Websites		

Grading Scheme			
Group	**Grade**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	90 - 100	Outstanding Performance.
	B - Very Good	80 - 89	Above average with some errors.
	C - Good	70 - 79	Sound work with notable errors.
	D - Satisfactory	60 - 69	Fair but with major shortcomings.
	E - Sufficient	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	(45-49)	More work is required, but credit is given.
	F – Fail	(0-44)	A significant amount of work is 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	Combustion and Pollution		**Module Delivery**
Module Type	C		☒ **Theory**
Module Code	ME304		☒ **Lecture**
ECTS Credits	4		☐ **Lab**
SWL (hr/sem)	100		☐ **Tutorial**
			☒ **Practical**
			☐ **Seminar**
Module Level	UGI	**Semester of Delivery**	1
Administering Department	SEE	**College**	COE
Module Leader	Abdulrahman Habbo Mohammed	**e-mail**	abidhabbo20@uomosul.edu.iq
Module Leader's Acad. Title	Ahmed Fouad	**Module Leader's Qualification**	Ph.d in mechanical eng
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	05/25/2026	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Introduction to combustion	**Semester**	
Co-requisites module	Combustion and pollution	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Students will be able to: 1- Classify the internal combustion engines. 2-Calculate air standard cycles performance. 3-Describe the main differences between Otto, Diesel and Dual cycles. 4-Analysis the fuel-air cycle and make a comparison with actual cycles. 5-Describe the combustion phenomena in S.I. engines and C.I. engines. 6-Classify the gas turbine units and their cycles, simple and modified cycles. 7- Classify the air craft engines and performance calculation, turbojet engine , turbo-fan 8- Analysis the exhaust emission from internal combustion engine.
Module Learning outcomes مخرجات التعلم للمادة الدراسية	4. An ability to distinguish, identify, define, and solve problems by applying 1st law of thermodynamics to combustion process 5. An ability to write the combustion equation , ideal and actual 6. Can calculate the actual air-fuel ratio , also students' can find the equivalence ratio and calculate the heat release 7. An ability to qualify the internal combustion engines , Diesel , Spark ignition engine and gas turbine 8. Students can able to distinguish between different type of engines that meet desired needs within certain constraints by applying theoretical principles and practical skills.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Introduction to combustion** [hrs.] - Combustion, definition and types (complete, incomplete and stoichiometric combustion), Calculation of air-fuel ratio from combustion equations, exhaust gases analysis (volumetric and gravimetric analysis Introduce the Electrical Sources 1st law of thermodynamic applied to combustion (hrs.] - 1st law of thermodynamic applied to combustion processes , heat released during combustion. Adiabatic flame temperature calculation [hrs.] - , second law of thermodynamic analysis:. - Using specific heat calculation method - Using enthalpy method Dissociation and chemical equilibrium. **Combustion phenomena in engines :** hrs.] - Advance combustion and maximum temperature - Explain four and two stroke cycle - Criteria engines performance for spark , diesel engines Brake power, indicated power volumetric efficiency and thermal efficiency **Four and Two stroke cycle** [19 hrs.] - Explain the concept of the four and two stroke Cycle - Ability to draw the pv and T-S diagram - Demonstrate the volumetric efficiency in Otto cycle - The main differences between Naturally aspirated system and turbo engines **Practical:** [30 hrs.] - Practical ability to design and install simple I.C engines for mechanical power including dynometer and exhaut gas analyzer weekly plan.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	48		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5, 11	LO # 1
	Assignments	1	5% (5)	10	LO # 1
	Practical	1	10% (10)	15	LO # 2 and 3
	Report	1	5% (5)	12	LO# 2
Summative assessment	**Midterm Exam**	1hr	10% (10)	8	LO # 1 and 2
	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 internal combustion engines Type and parts
Week 2	The purpose of I.C engines . is to convert chemical energy to mechanical energy
Week 3	Combustion Definition and types complete , incomplete and stoichiometric .
Week 4	Air- fuel ratio, how to calculate , Equivalence ratio , write a chemical combustion equation
Week 5	Exhaust gas analyzer. Moler and gravimetric wet and dry analyses
Week 6	First law of thermodynamics applied to combustion process
Week 7	Enthalpy of formation various type of element
Week 8	Calorific value of fuel , how to calculate (higher heating value and lower value)
Week 9	Flame temperature of hydrocarbon fuel , Adiabatic flame temperature calculation
Week 10	Enthalpy calculation of reactant and products
Week 11	Enthalpy of combustion at 25 ^{o}C (ΔH_o) , from table and calculation
Week 12	2nd law of thermodynamics applied to combustion process
Week 13	Equilibrium constants , from table and dissociation
Week 14	Classification of internal combustion engines
Week 15	Compression ratio , how can be explained

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Introduction to basic elements of engines
Week 2	Components and Symbols used in engines
Week 3	Performance of internal combustion engines which include volumetric efficiency and thermal efficiency, brake power , mechanical effiency and specific fuel consumption .
Week 4	Internal combustion engines cycles, Otto , Diesel cycle and dual cycle (air standard cycles)

Week 5	Combustion phenomena in internal combustion engines, Advance , retard and ideal
Week 6	Fuel-air cycles , Trapped temperature and masses of air, fuel and rsidual
Week 7	Gas turbine units and there application .

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	➢ **A Text book of Internal combustion engines, John Heywood**	yes
Recommended Texts	➢ Engineering fundamental of the internal combustion engine by Willard W Pulkrabek 2011	yes
Websites		

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.

(50 - 100)	**B -** Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
(0 – 49)	**F –** Fail	راسب	(0-44)	A significant amount of work is 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	Gas Dynamics			**Module Delivery**	
Module Type	C			☒ **Theory**	
Module Code	ME305			☒ **Lecture**	
ECTS Credits	4			☐ **Lab**	
SWL (hr/sem)	100			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	3		**Semester of Delivery**	1	
Administering Department	MECH		**College**	ENG	
Module Leader	Yaser Shuker Mahmood		**e-mail**	yaseralmola@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	MSc	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/04/2026		**Version Number**	2.	
Relation with other Modules العلاقة مع المواد الدراسية الأخرى					

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The third year under graduate course primarily intended for students mechanical engineering. There will be these parts: 25. Mach number calculation. 26. Calculate the properties of compressible flow. 27. Integral and Transcendental functions. 28. Convergine Divergine Nozzle calculation 29. Fanno Flow Calculation 30. Emphasis on applications and calculations which under graduate students in engineering may encounter in their next courses
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	9. An ability to distinguish, identify, define, formulate, and solve Gas Dynamics problems by applying compressibility flow techniques such as continuity equation, thermodynamics relations to solve problems, science, and mathematics. 10. An ability to produce simple flow designs that meet desired needs within certain constraints by applying theoretical principles and practical skills. 11. Use flow simulation software to analyze and carry out proper measurements and tests with quality assurance, interpret results, and utilize engineering judgment to make inferences.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Introduction to compressible flow:** [6 hrs] - Definitions, basic concepts, simple examples, and a review of compressible fluid flow **Sound velocity :** [6 hrs] - Introduction, definition of f sound velocity , and methods for calculation ,Examples - - **Mach number and aplications :** [6 hrs] - Introduction, Methods to calculation of Mach Number ,Aplications of Mach number **Compressible flow in varibles area ducts** [12 hrs]

	- Introduction to compressible flow in variable area duct ,Nozzle and diffuser ,Examples ,Using gas tables ,Calculate all properties of air throw variable area duct ,solutions some problems. - **Convergine Divergine Nozzle :** [12 hrs] - Introduction, principle of C-D Nozzle , Compressible flow in C-D Nozzle **Shock wave :** [12 hrs] - Introduction, Normal Shock wave ,Shock wave in Nozzle ,Shock wave in C-D Nozzle **Adiabatic Flow in Constant Arae duct with friction(Fanoo Flow)**[18 hrs] - Introduction ,Difinition of Fanno flow ,calculation of Mach number and all properties .Calculation the sutable length of duct with friction **Flow with heat addition or removal (**[12 hrs] - Introduction Definition of Ryleigh flow ,Mach number calculation with heat edition - Examples

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Expanding students' understanding of Gas Dynamics and providing them with a solid foundation in the fundamental concepts of the subject, as well as enabling them to distinguish between different types of flow.This course includes several components, such as lectures, tutorials, discussions, homework assignments, and e-learning platforms. The course will be taught in English, and all compulsory assignments must be submitted within the specified deadlines in order to be eligible for the examination.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem)	52	**Unstructured SWL (h/w)**	1.1

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (20)	5, 11	LO # 1
	Assignments	1	5% (5)	10	LO # 1
	Practical	1	10% (10)	15	LO # 2 and 3
	Report	1	5% (5)	12	LO# 2
Summative assessment	Midterm Exam	1hr	10% (10)	8	LO # 1 and 2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	An Introduction to Compressible Flow
Week 2	• Definitions and basic concepts. • Simple examples. • An overview of the flow of compressible fluids.
Week 3	Introduction to the Speed of Sound. • Definition of the Speed of Sound.
Week 4	• Methods for calculating the speed of sound.

	• Practical examples .
Week 5	An Introduction to Mach's Number and Its Applications• Methods for calculating the Mach number.
Week 6	• Applications of the Mach number in engineering and compressible flow.
Week 7	Term exam.
Week 8	Compressible flow in channels with variable cross-sectional area.
Week 9	Nozzle and Diffuser.
Week 10	Using gas tables
Week 11	• Solving a variety of practical problems.
Week 12	Shock Waves • Introduction. • Vertical Shock Wave .
Week 13	• Shock waves in convergent–divergent nozzles.
Week 14	Adiabatic flow in a channel of constant cross-sectional area with friction (Fanno Flow)
Week 15	• Calculating the Mach number and all flow-related properties. • Calculating the appropriate channel length, taking friction into account

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

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

Week 6	
Week 7	

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• C0mpressible Fluid Flow by Patric H. Oosthuizen first edition 1997 The Dynamic and Thermodynamics of Comressible Fluid Flow by Ascher H. Shapiro Volume 1 First edition 1953	Yes
Recommended Texts	➢ Fundamentals of Gas Dynamics by Robert D.Zuker, Edition 2002 ➢ Introduction to Fluid Mechanics by Robert T. Fox fifth edition 1993	yes
Websites	Department of Mechanical Engineering – College of Engineering	

Grading Scheme

مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	Non-Destructive testing			**Module Delivery**	
Module Type	C			☒ **Theory**	
Module Code	MEC306			☒ **Lecture**	
ECTS Credits	3			☐ **Lab**	
SWL (hr/sem)	75			☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	SEE	**College**	COE		
Module Leader	Dr. ANAS OBEED BALOD	**e-mail**	anasbalod@uomosul.edu.iq		
Module Leader's Acad. Title	Assistant Prof.	**Module Leader's Qualification**	PhD		
Module Tutor	Rwaa Abdallah	**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	08/13/2024	**Version Number**	1.0		
Relation with other Modules العلاقة مع المواد الدراسية الأخرى					

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The course contributes to the following student outcomes: 31. **Understand the basic principles** and physical backgrounds of different NDT methods, such as visual testing (VT), liquid penetrant testing (PT), magnetic particle testing (MT), ultrasonic testing (UT), eddy current testing (ET), and radiographic testing (RT). 32. **Select the appropriate NDT technique** and method for specific materials, components, or applications. 33. **Set up, calibrate, and operate** NDT equipment correctly. 34. **Perform and supervise tests** in accordance with established procedures. 35. **Interpret and evaluate** test results and indications with respect to applicable codes, standards, specifications, and procedures (e.g., ASME, ASTM, AWS, ISO 9712). 36. **Identify and characterize** various types of discontinuities, flaws, and material imperfections (e.g., cracks, voids, corrosion, lack of fusion in welds). 37. **Document and report** the results of NDT inspections clearly and effectively to specialist and non-specialist audiences. 38. **Apply safety precautions** and work within the safety norms inherent to each specific NDT method, especially concerning radiation safety in RT. 39. Use both algebraic and geometric approaches in problem-solving. 40. Develop a flexible and creative problem-solving ability. 41. Develop an experience in constructing, measuring, and troubleshooting circuits using circuit simulation software.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	12. An ability to distinguish, identify, define, formulate, and solve electric circuits problems by applying circuit analysis techniques such as Ohm's Law, Kirchhoff's Voltage and Current Laws, and network theorems (Thevenin, Norton, etc.) to solve circuit problems, science, and mathematics. 13. An ability to produce simple electric designs that meet desired needs within certain constraints by applying theoretical principles and practical skills. 14. Use circuit simulation software to analyze and carry out proper measurements and tests with quality assurance, interpret results, and utilize engineering judgment to make inferences.
Indicative Contents	Indicative content includes the following. - **Understand the basic principles** and physical backgrounds of different

المحتويات الإرشادية	NDT methods, such as visual testing (VT), liquid penetrant testing (PT), magnetic particle testing (MT), ultrasonic testing (UT), eddy current testing (ET), and radiographic testing (RT). - **Select the appropriate NDT technique** and method for specific materials, components, or applications. - **Set up, calibrate, and operate** NDT equipment correctly. - **Perform and supervise tests** in accordance with established procedures. - **Interpret and evaluate** test results and indications with respect to applicable codes, standards, specifications, and procedures (e.g., ASME, ASTM, AWS, ISO 9712). - **Identify and characterize** various types of discontinuities, flaws, and material imperfections (e.g., cracks, voids, corrosion, lack of fusion in welds). - **Document and report** the results of NDT inspections clearly and effectively to specialist and non-specialist audiences. - **Apply safety precautions** and work within the safety norms inherent to each specific NDT method, especially concerning radiation safety in RT.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The primary Strategies of a Non-Destructive Testing (NDT) course are to provide a comprehensive understanding of various NDT methods, enable the identification and characterization of defects in materials without causing damage, and ensure that personnel can apply these techniques according to industry standards and safety regulations.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5.2	**Structured SWL (h/sem)** الحمل الدراسي المنتظم للطالب خلال الفصل	33
Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13	**Unstructured SWL (h/sem)** الحمل الدراسي غير المنتظم للطالب خلال الفصل	17
		Total SWL (h/sem)	125

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (20)	5, 11	LO # 1
	Assignments	1	5% (5)	10	LO # 1
	Practical	1	10% (10)	15	LO # 2 and 3
	Report	1	5% (5)	12	LO# 2
Summative assessment	Midterm Exam	1hr	10% (10)	8	LO # 1 and 2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction-Non-Destructive testing
Week 2	Visual inspection
Week 3	Visual inspection
Week 4	Dye penetration testing
Week 5	Dye penetration testing
Week 6	Magnetic particle testing Radiography inspection
Week 7	Magnetic particle testing Eddy current testing

Week 8	Ultrasonic testing
Week 9	Ultrasonic testing
Week 10	Radiography inspection
Week 11	Radiography inspection
Week 12	Eddy current inspection
Week 13	Eddy current inspection
Week 14	Eddy current inspection
Week 15	Course review

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Introduction-Non-Destructive testing
Week 2	Visual inspection
Week 3	Dye penetration testing
Week 4	Magnetic particle testing
Week 5	Ultrasonic testing
Week 6	Radiography inspection
Week 7	Eddy current testing

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.

Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- nondestructive testing handbook. by: Robert C. McMaster. Publication date: 1959. Collection: internetarchivebooks; inlibrary; printdisabled. 2- Nondestructive Testing Handbook, Third Edition Volume 2, Liquid. 3- A - Nondestructive Testing Handbook, Ut, Vol. 7, 3rd Ed 1996.	NO
Recommended Texts	1-Introduction to Non-Destructive Testing / Failure Analysis and NDT Techniques by Dr. V. Jayakumar from Lakshmi publications,OML351.	No
Websites	https://classroom.google.com tepu7u7e	

Grading Scheme

مخطط الدرجات

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

(0 – 49)	**F –** Fail	راسب	(0-44)	A significant amount of work is 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	Mechanical Considerations			**Module Delivery**	
Module Type	C			☒ **Theory**	
Module Code	MEC307			☒ **Lecture**	
ECTS Credits	2			☐ **Lab**	
SWL (hr/sem)	50			☐ **Tutorial**	
				☒ **Practical**	
				☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	SEE		**College**	COE	
Module Leader	Dr. Ziad Shakeeb Al Sarraf		**e-mail**	ziadalsarraf@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	18/04/2026		**Version Number**	1.0	
Relation with other Modules العلاقة مع المواد الدراسية الأخرى					
Prerequisite module	None		**Semester**		

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Students will be able to: Introduction to Mechanical Considerations is a mandatory course for mechanical engineering students. This course provides an introduction to the fundamental principles of modern engineering. It equips students with essential skills in mechanical considerations, the ability to apply scientific theories practically, and an understanding of the factors affecting machine components, such as shafts, springs, belts, bearings, and gears, including stresses, deformations, and failure parameters. The primary objective of mechanical considerations is to ensure that machines operate efficiently to meet customer needs and are safe against anticipated failure patterns.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students who study Introduction to Design of Machine Elements will be able to: 1- Know the principles of Design of Machine Elements 2- Estimate the required properties of the material used in machine elements design 3- Classify, Calculate and analyze the stresses induced in Machine elements. 4- Define type of failure resulted in Machine elements. 5- Design of shafts. 6- Design of keys and coupling. 7- Design of belts. 8- Design of chain. 9- Design and selection of bearings. 10- Design of welded, riveted and bolted joints. 11- Design of power screws. 12- Design of springs. 13- Design of pressure vessels.
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	Introduction to Machine Element Design: 1. Understanding the principles of machine element design 2. Estimating the required properties of materials used in machine element design 3. Classifying, calculating, and analyzing stresses generated in machine elements 4. Identifying types of failures that may occur in machine elements 5. Shaft design 6. Switch and connection design 7. Belt design 8. Chain design 9. Bearing design and selection 10. Design of welded and bolted connections 11. Power screw design 12. Spring design 13. Pressure vessel design

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem)	33	**Structured SWL (h/w)**	5.2

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (20)	5, 11	LO # 1
	Assignments	1	5% (5)	10	LO # 1
	Practical	1	10% (10)	15	LO # 2 and 3
	Report	1	5% (5)	12	LO# 2
Summative assessment	Midterm Exam	1hr	10% (10)	8	LO # 1 and 2
	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 Design of Machine Elements
Week 2	Design Considerations:
Week 3	Engineering Materials, Mechanical properties of materials

Week 4	Stress and strain, complex stress and strain
Week 5	Combined stress and Mohr□s circle First Quiz
Week 6	Design of Keys and Couplings
Week 7	Design of shafts, solid, hollow and step shafts
Week 8	Mid-term Exam
Week 9	Design of belts
Week 10	Design of chain
Week 11	Columns
Week 12	ASME design code for transmission shafting
Week 13	Design and selection of bearings
Week 14	Design of bolts and nuts
Week 15	Introduction to Design of Machine Elements

	Text	**Available in the Library?**
Required Texts	Design of Machine Elements by V. B. Bhandari (The best one is Machine Design Data Book)	Yes
Recommended Texts	Machine Element in Mechanical Design by R. Mott (Fourth Edition, and more) Mechanical Engineering Design by Shigley's ➢ (Ninth Edition)	Yes
	Design of Machine Elements by V. B. Bhandari (The best one is Machine Design Data Book)	
	Follow global websites	
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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	Machine Element Design			**Module Delivery**	
Module Type	C			☒ **Theory**	
Module Code	MEC351			☒ **Lecture**	
ECTS Credits	6			☐ **Lab**	
SWL (hr/sem)	150			☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	SEE	**College**	COE		
Module Leader	Dr. Ziad Shakeeb Al Sarraf	**e-mail**	ziadalsarraf@uomosul.edu.iq		
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	18/04/2026	**Version Number**	1.0		
Relation with other Modules					

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Introduction to Design of Machine parts is a required course for mechanical engineering students. This course is an intermediate to the basic principles of modern engineering. It provides the students with fundamental skills of engineering and the ability to apply the theories of science to practice and understand the factors; such as stresses, deformations, and failure criteria, influencing the machine elements like shafts, springs, belts, bearings, gears etc. The main objective of design of machine parts is that the machine should function properly to satisfy the needs of the customer and it should be safe against the predicted modes of failure.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students who study Introduction to Design of Machine Elements will be able to: 1- Know the principles of Design of Machine Elements 2- Estimate the required properties of the material used in machine elements design 3- Classify, Calculate and analyze the stresses induced in Machine elements. 4- Define type of failure resulted in Machine elements. 5- Design of shafts. 6- Design of keys and coupling. 7- Design of belts. 8- Design of chain. 9- Design and selection of bearings. 10- Design of welded, riveted and bolted joints. 11- Design of power screws. 12- Design of springs.

	13- Design of pressure vessels.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Machine Element Design: 1. Understanding the principles of machine element design 2. Estimating the required properties of materials used in machine element design 3. Classifying, calculating, and analyzing stresses generated in machine elements 4. Identifying types of failures that may occur in machine elements 5. Shaft design 6. Switch and connection design 7. Belt design 8. Chain design 9. Bearing design and selection 10. Design of welded and bolted connections 11. Power screw design 12. Spring design 13. Pressure vessel design
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.
Student Workload (SWL) الحمل الدراسي للطالب	

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5, 11	LO # 1
	Assignments	1	5% (5)	10	LO # 1
	Practical	1	10% (10)	15	LO # 2 and 3
	Report	1	5% (5)	12	LO# 2
Summative assessment	**Midterm Exam**	1hr	10% (10)	8	LO # 1 and 2
	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 Design of Machine Elements

Week 2	Design Considerations:
Week 3	Engineering Materials, Mechanical properties of materials
Week 4	Stress and strain, complex stress and strain
Week 5	Combined stress and Mohr□s circle First Quiz
Week 6	Design of Keys and Couplings
Week 7	Design of shafts, solid, hollow and step shafts
Week 8	Mid-term Exam
Week 9	Design of belts
Week 10	Design of chain
Week 11	Columns
Week 12	ASME design code for transmission shafting
Week 13	Design and selection of bearings
Week 14	Design of bolts and nuts
Week 15	Introduction to Design of Machine Elements

	Text	**Available in the Library?**
Required Texts	Design of Machine Elements by V. B. Bhandari (The best one is Machine Design Data Book)	Yes
Recommended Texts	Machine Element in Mechanical Design by R. Mott (Fourth Edition, and more) Mechanical Engineering Design by Shigley's (Ninth Edition)	Yes
	Design of Machine Elements by V. B. Bhandari (The best one is Machine Design Data Book)	
	Follow global websites	

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 is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is 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	**Convective and Radiative Heat Transfer**			**Module Delivery**	
Module Type	**Core**			• ☒ **Theory** • ☐ **Lecture** • ☐ **Lab** • ☒ **Tutorial** • ☐ **Practical** • ☐ **Seminar**	
Module Code	**ME352**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Maan S. Mohammed Al Dabbagh		**e-mail**	maandabbagh@uomosul.edu.iq	
Module Leader's Acad. Title	Ass. Prof.		**Module Leader's Qualification**	M.Sc	
Module Tutor	Name (if available)		**e-mail**	maandabbagh@uomosul,edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	2023-2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Thermodynamics II (ME252)	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims **أهداف المادة الدراسية**	Students will be able to: 10. Write clear the objectives of this integrated subject 11. Develop the fundamental principles and laws of heat transfer and to explore the implications of these principles for system behavior including: formulate the models necessary to study 12. an ability to work with the concepts mathematically, and a functional understanding of how these ideas play out in the real world.

	13. analyze and design heat transfer systems through the application of these principles 14. Use graphs and diagrams to convey results. 15. develop the problem-solving skills essential to good engineering practice of heat transfer in real-world applications 16. Decide on strategies to be used and assumptions that need to be made. 13. Develop a flexible and creative problem-solving ability. 14. Translate physical descriptions into mathematical equations. 15. Examine intermediate results or other quantities that could be used to ensure a solution. 16. Develop their ability to communicate ideas of science. 17. Identify what they don't understand, and ask specific questions in order to gain understanding.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	16. The modes of heat transfer 17. Explain the conduction, convection and radiation heat transfer. 18. Steady state conduction – one dimension – (plane wall , radial systems) 19. Insulation and thermal resistance value, the overall heat transfer coefficient , critical thickness of insulation 20. Define Ohm's law 21. Explain, and apply Fourier's law of conduction, Newton's laws of cooling . 22. Understand fundamentals of energy, 23. Understand and apply the basic idea of heat transfer theorem to physical systems. 24. Study the types of insulation and the effect of thermal conductivity for materials. 25. Study the behavior of temperature distribution in the plane wall, radial systems with no heat generation. 26. Explain the meaning of the overall heat transfer coefficient . 27. The mathematical models of the physical systems are explained 28. Define and describe the steady principle, and the heat source in the wall. 29. Derive the equation of three dimension heat source unsteady heat conduction. 30. Heat source systems , cylinder with heat sources, conduction - convection systems . 31. Study the behavior of temperature distribution in the plane wall, radial systems with heat generation. 32. Heat transfer by the extended surface area (fins) 33. Study the effect of the extended surface area on the rate of heat transfer. 34. Unsteady state conduction (lumped – heat capacity system) 35. Transient heat flow in semi – infinite solid
Indicative Contents **المحتويات الإرشادية**	Indicative content includes the following. **Basic Quantities, including:** [10 hrs] • State SI units, and write the units and their abbreviations correctly. • The advantage of developing the students ability to understand conduction heat transfer object. • Know the types of energy and practice applications.

	• Know the heat transfer effect on solid. • How can be calculate the heat lost and gain from or by the system. • How can be calculate the heat lost by the Unsteady state conduction • Distinguish heat transfer between plane wall system and radial system. • How can used the Ohm's law in conduction **Newton's laws and it is applications:** [10 hrs] • State, explain, and apply Newton's laws of cooling. • Differentiate between the resistance. • How can calculate the overall heat transfer coefficient. • Solve problems using Newton's law of cooling **Heat transfer by the extended surface area:** [15 hrs] • What is the extended surface area (fins) • The types of fins (vary long , finite length, insulated end . • How can be calculate the heat lost by the fins. • Calculate the temperature distribution for extended surface. **Unsteady – state conduction** [10hrs] • Semi – infinite solid with sudden change in surface condition. • Long cylinder suddenly exposed to convection. • Heat loss for finite- length cylinder. • Applicability of lumped capacity analysis. • Explain the Heisler chart . •

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	48	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	3.2
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	52	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	3.5
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	100		

Module Evaluation
تقييم المادة الدراسية

	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome

Formative assessment	**Quizzes**	3	10% (10)	4, 9, 12	LO #1, 2, 10 and 11
	Assignments	4	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.		0% (0)		
	Report	1	5% (5)	9	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction , dimensions and unit, The modes of heat transfer,
Week 2	The properties (thermal conductivity, heat transfer coefficient)
Week 3	Steady state conduction – one dimension – (plane wall , radial systems)
Week 4	Solved problems chapter No.1 Homework 1 Quiz
Week 5	Insulation and thermal resistance value, the overall heat transfer coefficient ,
Week 6	critical thickness of insulation
Week 7	Heat source systems ,heat source in the plane wall, radial system with heat sources
Week 8	Heat source systems , cylinder with heat sources, conduction - convection systems
Week 9	Solved problems chapter No.2 Homework 4 Quiz
Week 10	The extended surface area (fins)
Week 11	Solved problems chapter No.2 Homework 5 Quiz
Week 12	1st term Examination
Week 13	Unsteady state conduction (lumped – heat capacity system),Transient heat flow in semi – infinite solid
Week 14	Solved problems chapter No.4 Homework 6 Quiz
Week 15	Solved problems chapter No.4 Homework 7 Quiz
Week 16	2nd term Examination

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Heat transfer , tenth edition(2010) , J.P. Holman , McGRAW hill international edition	Yes
Recommended Texts	Fundamental of HEAT and MASS transfer, Seventh Edition, Theodre L. Bergman, Adrienne S, Lavine, Frank P. Incropera, David P. Dewitt John Wiley & Sons, 2011	No
Websites		

Grading Scheme

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Numerical Analyses			**Module Delivery**	
Module Type	B			☐ **Theory**	
Module Code	ME353			☒ **Lecture**	
ECTS Credits	6			☒ **Lab**	
SWL (hr/sem)	150			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	Mechanical		**College**	Engineering	
Module Leader	Dr. Saddam Atteyia Mohammad		**e-mail**	saddamatteyia@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Mahmood Osama Jasem		**e-mail**	mahmood14@uomosul.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	15/1/2026		**Version Number**	1.0	
Relation with other Modules العلاقة مع المواد الدراسية الأخرى					
Prerequisite module	Mathematics III		**Semester**	4	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Understand some special functions (Gamma function and Beta function), and using mathematical manipulation to solve problems of Gamma and Beta functions. 2. Understand the basic concepts of partial differential equations and the related initial and boundary conditions, and classifying the types of partial differential equations. 3. Applying separation of variables method to formulate the general and particular solutions of wave, heat, and Laplace equations. 4. Finding solutions of complex numbers. 5. Numerically obtain the solution of equation by iteration. 6. Find the solution of system of linear equations using numerical technique. 7. Be able to make numerical integration, numerical differentiation, and curve fitting. 8. Obtain numerical solution for first-order differential equation. 9. Improve their ability to communicate scientific ideas.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Interpreting numerical data and applying mathematical methods to problem analysis. 2. The ability to use standard tools and techniques to conduct and design practical experiments on mechanical and electromechanical systems and to accurately analyze and interpret data. 3. The ability to recognize the ongoing need for professional knowledge growth and to identify, evaluate, synthesize, and apply it effectively.
Indicative Contents المحتويات الإرشادية	-Special functions: [18hr] Gamma function with solution of problems Beta function with solution of problems

	-Partial differential equations PDEs: [28hr] Basic concepts, Boundary conditions, initial conditions, and types of PDE. Types of boundary conditions, fundamental theorem (superposition principle), One-dimensional wave equation. Applying the method of separating variables (product method) to find the solution of wave equation. Solution of problems on wave equation. Heat Flow with application and solution of problems. Solution of problems on heat flow. Laplace equation and its solution with solution of problems. -Complex number: [17hr] Complex number, complex plane, properties of the arithmetic operations, complex conjugate numbers, solution of problems. Polar form of complex numbers, triangle inequality, multiplication and Division in polar form. Integer powers of Z, roots, solution of problems. -Introduction, error, source of errors, and ways of representing numbers: [6hr] -Solution of equations by Iteration (Roots of Equations): [16hr] Introduction, Newton's method, and secant method Bisection method and False-Position method. -Solution of system of linear equations: [20hr] Introduction, ill-conditioned problem, well-conditioned problem. Singular matrix, non-singular matrix, the difference between direct and indirect methods.

	Jacobi iteration method, Gauss-Seidel iteration method. Improving of convergence using relaxation. -Numerical Differentiation: [15hr] Forward, Backward, and centered difference approximation of the first derivative. Finite difference approximations of higher derivatives. -Numerical integration: [15hr] Rectangular rule, Trapezoidal rule, and Simpson's rule -Methods for first-order differential equations: [10hr] Euler method, Improved Euler method. Runge-Kutta method (of 4^{th} order). -Linear regression, the least-squares regression lines. [5hr]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The primary strategy for delivering this module will be to encourage students to participate actively in the process of solving analytical and numerical problems in order to improve their mathematical thinking skills. This will be accomplished through class exercises and homework and exams.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	4.8

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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	4	15% (15)	3,6,10,14	LO # 1 and 3
	Assignments	2	15% (15)	1,5	LO # 1 and 3
	Practical	1	5% (5)	12	LO # 2
	Report	1	5% (5)	13	LO# 3
Summative assessment	Midterm Exam	1hr	10% (10)	8	LO # 1 and 2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	-Special functions: Gamma function with solution of problems. -Concept and role of the numerical methods in engineering, approximations, and errors, the definition of round-off error and truncation error, absolute and relative error.
Week 2	-Solution of problems on Gamma function. - Numerical Integration: Trapezoidal Rule, Simpson's 1/3 Rule

Week 3	-Solution of problems on Gamma function. - Numerical Integration: Trapezoidal Rule, Simpson's 1/3 Rule
Week 4	-Beta function with solution of problems. irst - Numerical Differentiation: Taylor Series and truncation error, The approximation of the derivative (FDA, BDA, and CDA), The approximation of the second derivative (FDA, BDA, and CDA).
Week 5	-Beta function with solution of problems. irst - Numerical Differentiation: Taylor Series and truncation error, The approximation of the derivative (FDA, BDA, and CDA), The approximation of the second derivative (FDA, BDA, and CDA).
Week 6	-Solution of problems on Beta function. -Curve Fitting: Classification of Curve Fitting (Regression and Interpolation), the concepts of regression, and Least Square Criterion, Linear Regression.
Week 7	-Solution of problems on Beta function. -Curve Fitting: Classification of Curve Fitting (Regression and Interpolation), the concepts of regression, and Least Square Criterion, Linear Regression.
Week 8	-Partial differential equations PDEs - Numerical Solution of Nonlinear Algebraic Equations (Roots of Equations): Bracketing Methods (Bisection, and False-Position method), Open Methods (Newton-Raphson and secant method).
Week 9	-Partial differential equations PDEs - Numerical Solution of Nonlinear Algebraic Equations (Roots of Equations): Bracketing Methods (Bisection, and False-Position method), Open Methods (Newton-Raphson and secant method).
Week 10	-Laplace equation and its solution with solution of problems.

	- Numerical Solution of linear algebraic equations (system): the difference between the direct and indirect methods, Singular and ill/well-conditioned system, Partial and complete Pivoting, Convergence criteria, Jacobi iterative method, The Gauss-Seidel iterative method, Gauss-Seidel iterative with the relaxation factor method.
Week 11	-Laplace equation and its solution with solution of problems. - Numerical Solution of linear algebraic equations (system): the difference between the direct and indirect methods, Singular and ill/well-conditioned system, Partial and complete Pivoting, Convergence criteria, Jacobi iterative method, The Gauss-Seidel iterative method, Gauss-Seidel iterative with the relaxation factor method.
Week 12	-Complex number, complex plane - Numerical Solutions of Ordinary Differential Equation (ODE): Classification of Differential Equations (Initial Value Problem "IVP" and Boundary Value Problem "BVP"), The numerical methods for solving the IVP (Euler's method and modified Euler's method)
Week 13	-Complex number, complex plane - Numerical Solutions of Ordinary Differential Equation (ODE): Classification of Differential Equations (Initial Value Problem "IVP" and Boundary Value Problem "BVP"), The numerical methods for solving the IVP (Euler's method and modified Euler's method)
Week 14	-The polar form of complex numbers - Fourth order Runge-Kutta method for solving the IVP, Numerical solution for systems of ODEs with the two methods above.
Week 15	Integer powers of Z, roots, solution of problems.
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered

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

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Erwin Kreyszig, Herbert Kreyszig, and Edward J. Norminton, "Advanced Engineering Mathematics", Tenth Edition, John Wiley & Sons, 2011.	Yes
Recommended Texts	-K. A. Stroud and Dexter J. Booth, "Advanced Engineering Mathematics ", Fourth Edition, Palgrave Macmillan, 2003. -Steven C. Chapra and Raymond P. Canale,	No

	"Numerical Methods for Engineers: With Software and programming Applications", Fourth Edition, 2003.	
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 works with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Internal combustion engines			**Module Delivery**	
Module Type	C			☒ **Theory**	
Module Code	ME355			☒ **Lecture**	
ECTS Credits	4			☐ **Lab**	
SWL (hr/sem)	100			☐ **Tutorial**	
				☒ **Practical**	
				☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	SEE	**College**	COE		
Module Leader	Abdulrahman Habbo Mohammed	**e-mail**	abidhabbo20@uomosul.edu.iq		
Module Leader's Acad. Title	Ahmed Fouad	**Module Leader's Qualification**	Ph.d in mechanical eng		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	05/25/2026	**Version Number**	1.0		
Relation with other Modules العلاقة مع المواد الدراسية الأخرى					

Prerequisite module	Introduction to combustion	**Semester**	
Co-requisites module	Combustion and pollution	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Students will be able to: 1- Classify the internal combustion engines. 2-Calculate air standard cycles performance. 3-Describe the main differences between Otto, Diesel and Dual cycles. 4-Analysis the fuel-air cycle and make a comparison with actual cycles. 5-Describe the combustion phenomena in S.I. engines and C.I. engines. 6-Classify the gas turbine units and their cycles, simple and modified cycles. 7- Classify the air craft engines and performance calculation, turbojet engine , turbo-fan 8- Analysis the exhaust emission from internal combustion engine.
Module Learning outcomes مخرجات التعلم للمادة الدراسية	15. An ability to distinguish, identify, define, and solve problems by applying 1st law of thermodynamics to combustion process 16. An ability to write the combustion equation , ideal and actual 17. Can calculate the actual air-fuel ratio , also students' can find the equivalence ratio and calculate the heat release 18. An ability to qualify the internal combustion engines , Diesel , Spark ignition engine and gas turbine 19. Students can able to distinguish between different type of engines that meet desired needs within certain constraints by applying theoretical principles and practical skills.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Introduction to combustion** [hrs.] - Combustion, definition and types (complete, incomplete and stoichiometric combustion), Calculation of air-fuel ratio from combustion equations, exhaust gases analysis (volumetric and gravimetric analysis Introduce the Electrical Sources 1st law of thermodynamic applied to combustion (hrs.] - 1st law of thermodynamic applied to combustion processes , heat released during combustion. Adiabatic flame temperature calculation [hrs.] - , second law of thermodynamic analysis:. - Using specific heat calculation method - Using enthalpy method Dissociation and chemical equilibrium. **Combustion phenomena in engines :** hrs.] - Advance combustion and maximum temperature - Explain four and two stroke cycle - Criteria engines performance for spark , diesel engines Brake power, indicated power volumetric efficiency and thermal efficiency **Four and Two stroke cycle** [19 hrs.] - Explain the concept of the four and two stroke Cycle - Ability to draw the pv and T-S diagram - Demonstrate the volumetric efficiency in Otto cycle - The main differences between Naturally aspirated system and turbo engines **Practical:** [30 hrs.] - Practical ability to design and install simple I.C engines for mechanical power including dynometer and exhaut gas analyzer weekly plan.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	48		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (20)	5, 11	LO # 1
	Assignments	1	5% (5)	10	LO # 1
	Practical	1	10% (10)	15	LO # 2 and 3
	Report	1	5% (5)	12	LO# 2
Summative assessment	Midterm Exam	1hr	10% (10)	8	LO # 1 and 2
	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 internal combustion engines Type and parts
Week 2	The purpose of I.C engines . is to convert chemical energy to mechanical energy
Week 3	Combustion Definition and types complete , incomplete and stoichiometric .
Week 4	Air- fuel ratio, how to calculate , Equivalence ratio , write a chemical combustion equation
Week 5	Exhaust gas analyzer. Moler and gravimetric wet and dry analyses
Week 6	First law of thermodynamics applied to combustion process
Week 7	Enthalpy of formation various type of element
Week 8	Calorific value of fuel , how to calculate (higher heating value and lower value)
Week 9	Flame temperature of hydrocarbon fuel , Adiabatic flame temperature calculation
Week 10	Enthalpy calculation of reactant and products
Week 11	Enthalpy of combustion at 25 ^{o}C (ΔH_o) , from table and calculation
Week 12	2nd law of thermodynamics applied to combustion process
Week 13	Equilibrium constants , from table and dissociation
Week 14	Classification of internal combustion engines
Week 15	Compression ratio , how can be explained

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Introduction to basic elements of engines
Week 2	Components and Symbols used in engines
Week 3	Performance of internal combustion engines which include volumetric efficiency and thermal efficiency, brake power , mechanical effiency and specific fuel consumption .
Week 4	Internal combustion engines cycles, Otto , Diesel cycle and dual cycle (air standard cycles)

Week 5	Combustion phenomena in internal combustion engines, Advance , retard and ideal
Week 6	Fuel-air cycles , Trapped temperature and masses of air, fuel and rsidual
Week 7	Gas turbine units and there application .

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	➢ **A Text book of Internal combustion engines, John Heywood**	yes
Recommended Texts	➢ Engineering fundamental of the internal combustion engine by Willard W Pulkrabek 2011	yes
Websites		

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.

(50 - 100)	**B -** Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
(0 – 49)	**F –** Fail	راسب	(0-44)	A significant amount of work is 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 Project ,Design and Planning**			**Module Delivery**	
Module Type	**Core**			☐ **Theory**	
Module Code	**ME358**			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	3		**Semester of Delivery**	5	
Administering Department	ME		**College**	ENG	
Module Leader	Ataalah Hussain Jassim		**e-mail**	atalalah.jasim@uomosul.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Students will be able to: 1. To enable students the ability to employ the skills they have learnt in their course program to solve and/or enhance an opportunity. 2. To enable students to explore, study, and develop a specificshowcase, independently. 3. To enrich students' business strategy development and operational implementation relevant to their organizations and/or personal needs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. require students to employ their learned skills (e.g., pipe network analysis or dam pressure calculations) to solve or enhance a specific engineering opportunity. 2. **Independent Research & Case Studies:** Enabling students to explore and study a specific fluid phenomenon or a "showcase" technology (such as a specific type of pump or flow meter) independently to develop a technical presentation or model. 3. **Applied Strategic Design:** Integrating business and operational logic by asking students to develop fluid systems that are not only technically sound but also cost-effective and operationally feasible, relevant to industrial standards or personal innovative needs. 4. **Iterative Design & Implementation:** Encouraging students to go through the cycle of "Plan, Design, and Evaluate," where they must implement their theoretical knowledge into a practical operational framework.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A **Project Proposal - Initial Evaluation** [15 hrs] • Submission of the initial project abstract, problem statement, objective

	definition, and tentative methodology. The faculty board evaluates the project's technical merit, scope appropriateness, and resource availability. • Presentation of the literature review, alternative design solutions, economic/environmental constraints, risk management strategies, and a detailed project schedule (e.g., Gantt chart). **Part B Project Proposal - Final Evaluation:** [15 hrs] • Defense of the complete theoretical design, engineering calculations, software architectures, or blueprints. Passing this phase grants approval to move from planning to physical or software implementation. • Assessment of progress regarding fabrication, coding, simulation, or data collection. Deliverables are checked against the baseline schedule to ensure the project is on track. **Part C Project Implementation - Final Deliverable :** [20 hrs] - Final testing, optimization, integration, and validation of the working prototype, system, or complete engineering plan against the initial user requirements.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	50		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	5% (20)	4, 9,12,14	LO # 1, 2 ,10 and 11
	Assignments	2	10% (10)	2,12	LO # 3,4 and 7
	Projects / Lab.	1	5%(5)	12	
	Report	1	5% (5)	13	LO # 5 ,8 and 10
Summative assessment	Midterm Exam	1 hr	10% (10)	7	LO # 1-4
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Graduation Project , Description
Week 2	Project Topic, Students and Their Roles
Week 3	Project Topic, Students and Their Roles
Week 4	Project Phases.
Week 5	Phase 1: Project Proposal - Initial Evaluation
Week 6	Phase 2: Project Proposal - Midterm Evaluation
Week 7	Phase 3: Project Proposal - Final Evaluation
Week 8	Phase 4: Project Implementation - Midterm Evaluation.
Week 9	Phase 5: Project Implementation.
Week 10	Discussion and Evaluation
Week 11	Methods Of Discussion and Evaluation
Week 12	Grading Policy
Week 13	Frequent Questions during the Discussion
Week 14	Formatting Structure of the Project
Week 15	Academic Integrity/Plagiarism, Appendices
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Design: A Project-Based Introduction, Clive L. Dym, Patrick Little, and Elizabeth Orwin, Harvey Mudd College. – 4th edition, 2014, Wiley	Yes
Recommended Texts	Project Management for Engineering, Business and Technology, John M. Nicholas and Herman Steyn, 7th Edition. First Published 2025	No
Websites		

Grading Scheme

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اسم وتوقيع صاحب المقرر
أ.د.عطاالله حسين جاسم

اسم وتوقيع رئيس القسم
ا.م.د. عبدالحق عبدالقادر حامد