University of Mosul
جامعة الموصل

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

بكالوريوس - هندسة ميكانيك

Table of Contents

1. LEVEL UGI
2. LEVEL UGII

MECHANICAL ENGINEERING

MODULE DESCRIPTION FORM

LEVEL UGI

SEMESTER 1 and 2

SEMESTER 1	
ME101	Engineering Mechanics-Statics
ME102	Mathematics I
ME103	Manufacturing Processes I
ME104	Engineering Drawing
ME105	English Language I
ME106	Human Rights
SEMESTER 2	
ME151	Engineering Mechanics-Dynamics
ME152	Mathematics II
ME153	Physical Metallurgy
ME154	Introduction to Electrical Engineering
ME155	Computer Programming I
ME156	Democracy

LEVEL UGI
SEMESTER 1

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Engineering Mechanics-Statics**			**Module Delivery**	
Module Type	**C**			☒ **Theory**	
Module Code	**ME101**			☒ **Lecture**	
ECTS Credits	**8**			☐ **Lab**	
SWL (hr/sem)	**200**			☒ **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)	93	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	107	**Unstructured SWL (h/w)**	7

Total SWL (h/sem)	200

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	**5**				
SWL (hr/sem)	**125**				
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	62	**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, 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 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	**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. **Part A – Introduction to Manufacturing Processes:[5 hrs]** - 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 **Part B – Machining Processes [20 hrs]** - 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)	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, 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.

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	**Engineering Drawing**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME104**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
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)	78	**Structured SWL (h/w)**	5.2
Unstructured SWL (h/sem)	97	**Unstructured SWL (h/w)**	6.4
Total SWL (h/sem)	175		

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 assessment	**Midterm Exam**	3hr	20% (20)	10	LO # 1-4
	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 **Week 11** **Week 12**	**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 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	**English Language I**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME105**				
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	29. The main objective of this course is to emphasize the fundamental language skills of reading, writing, speaking, listening, thinking, viewing, and presenting. 30. The course includes studies of various literary genres: short story, novel, and non-fiction. 31. 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	21. In this course the students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening. 22. Students will heighten their awareness of correct usage of English grammar in writing and speaking. 23. Students will improve their speaking ability in English both in terms of fluency and comprehensibility. 24. Students will give oral presentations and receive feedback on their performance. 25. Students will increase their reading speed. 26. Students will improve their reading fluency skills through extensive reading. 27. 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 (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 of Human Rights (TBD)

LEVEL UGI
SEMESTER 2

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Engineering Mechanics Dynamics**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME151**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
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)	93	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	107	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	200		

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.

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME152**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
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: 32. Write clear mathematical arguments including effective use of physical equations. 33. 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. 34. Use graphs and diagrams to convey results. 35. Decide on strategies to be used and assumptions that need to be made. 36. Use both algebraic and geometric approaches in problem-solving. 37. Develop a flexible and creative problem-solving ability. 38. Develop an integrated understanding of the both the definite and finite integral. 39. Integrate all the types of equations those be able to integrate such as transcendental equations (logarithm and hyperbolic), linear, non-linear, and rational equations. 40. Find the dimensions such as length, area, and volume for any shapes by utilizing the integrate. 41. Develop their ability to communicate ideas of science.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	28. Understand how to estimate the Area between curves. 29. Explain the Indefinite Integrals and the Substitution Method. 30. Understand the Volumes calculation Using Cross-Sections. 31. Understand the Volumes calculation Using Cylindrical Shells. 32. Explain Arc Length calculation. 33. Understand the Areas of Surfaces of Revolution. 34. Explain The Logarithm Defined as an Integral. 35. Using Basic Integration Formulas. 36. Understand Integration by Parts. 37. Explain the Trigonometric Integrals and substitutions. 38. 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) 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	62	**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, 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	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	**Physical Metallurgy**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME153**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
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	42. To develop the capacity of first-level students to recognize types of metals, their properties, and applications. 43. 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. 44. To understand the macro- and microstructure of metal s. 45. Analysis of the phase diagrams of alloy systems and understanding their effect on mechanical properties of metals.

	46. Applying the equilibrium principle to simple trusses and frames.
Module Learning Outcomes	10. The course offers basic knowledge of physical metallurgy. 11. Describe the standard tests used for determining metals' mechanical properties. 12. Explains the atomic structure and atomic bonding in metals. 13. Discuss the effect of microstructure on the mechanical properties of metals. 14. 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)	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 #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	**5**			☐ **Lab**	
SWL (hr/sem)	**125**			☐ **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: 1. Introduce the fundamentals of circuit analysis. 2. 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. 3. 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. 4. 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. 5. 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. 6. 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. 7. Introduction to power electronic rectifier Electric battery –charger and DC to AC invertors. 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. Examine intermediate results or other quantities that could be used to ensure a solution is physically reasonable. 13. Develop their ability to communicate ideas of science. 14. Identify what they don't understand, and ask specific questions in order to gain understanding. 15. 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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	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	**Computer Programming I**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME155**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		ME	**College**	COE	
Module Leader	Eman Mohammed Ali		**e-mail**	emanmali@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. 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: 47. To introduce engineering students to the fundamental concepts and principles of programming. 48. To develop the skills necessary for engineering students to solve engineering problems using programming. 49. To foster a problem-solving mindset and logical thinking in the context of engineering applications. 50. Understand the main features of the MATLAB development environment. 51. Design simple algorithms to solve problems. 52. Write simple programs in MATLAB to solve scientific and mathematical problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand the MATLAB environment and syntax. 2- Write MATLAB programs to solve engineering problems. 3- Utilize control structures (if-else statements, loops) to implement algorithms and logic. 4- Utilize built-in functions and libraries for engineering computations and simulations. 5- Apply MATLAB for engineering calculations, such as solving equations, optimization, and root finding. 6- Utilize MATLAB's matrix operations for linear algebra and system solving. 7- Perform numerical integration and differentiation using MATLAB. 8- Generate plots and visualizations to represent engineering data effectively. 9- Simulate and model engineering systems using MATLAB.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Introduction to MATLAB:** [25hrs] - Starting MATLAB - Working in the command window - Saving a program: script files - Arithmetic operations with scalars **MATLAB Fundamentals:** [25hrs] - Variables and the Workspace - Arrays: vectors and matrices - Operators, expression and statements - Repeating with for - Programing style **Creating Arrays:** [25hrs] - Creating a one-dimensional array (vector) - Creating a two-dimensional array (matrix) - The transpose operator - Array addressing - Adding elements to existing variables - Strings and strings as variables **Mathematical operations with arrays:** [25hrs] - Adding and subtraction - Array multiplication - Array division - Generation of random numbers - Built-in functions for analyzing arrays - Examples of MATLAB applications **Two-Dimensional plots:** [25hrs] - The plot command - The fplot command

	- Plotting multiple graphs in the same plot - Plot with error bars - Histograms - Polar plots - Multiple figure window

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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**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)	3,6,9,12, and 14	LO # 2,4,6,7,8 and 9
	Assignments	5	10% (10)	3, 6,9,12, and 14	LO # 2,4,6,7,8 and 9
	Projects / Lab.		10% (10)	all	all
	Report		0% ()		
Summative assessment	Midterm Exam	1.5hr	20% (20)	8	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Starting with MATLAB: Starting MATLAB, MATLAB windows, working in the command window, Arithmetic operations with scalars
Week 2	Defining scalar variables: the assignments operators, rules about variables names, predefined variables and keywords
Week 3	Script files: notes about script files, creating and saving script files, and running a script file
Week 4	Creating Arrays: creating a one-dimensional array, creating a two-dimensional array, the transpose operator, and array addressing.
Week 5	Creating Arrays: adding elements to existing variables, deleting elements, built-in function for handling arrays, strings and strings as variables.
Week 6	Mathematical operations with arrays: adding and subtraction, array multiplications, array division, built-in function for analyzing arrays.
Week 7	Using script files and managing data
Week 8	User-defined function and function files
Week 9	Programming in MATLAB: relational and logical operators, conditional statements
Week 10	Programming in MATLAB: loops, the break and continue commands
Week 11	Application in numerical analysis: solving an equation with one variable, finding a minimum and maximum of a function, and numerical integration
Week 12	Application in numerical analysis: ordinary differential equations, and examples of Engineering applications
Week 13	Two-dimensional plots: the plot command, the fplot command, plotting multiple graphs in the same plot, and formatting a plot
Week 14	Two-dimensional plots: plot with error bars, histograms, polar plots, and multiple figures window
Week 15	Three-dimensional plots: line plots, mesh and surface plots, plots with special graphics.
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	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 of Democracy (TBD)

MECHANICAL ENGINEERING

MODULE DESCRIPTION FORM

LEVEL UGII

SEMESTER 3 and 4

SEMESTER 3	
ME201	Fluid Mechanics I
ME202	Thermodynamics I
ME203	Mechanics of Materials I
ME204	Engineering Mathematics
ME205	Computer Programming II
ME206	English Language II
SEMESTER 4	
ME251	Fluid Mechanics II
ME252	Thermodynamics II
ME253	Mechanics of Materials II
ME254	Mechanical Engineering Laboratory I
ME255	Mechanical Drawing
ME256	Metallurgy

LEVEL UGII
SEMESTER 3

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fluid I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME201**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
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	1. Understand and apply the fundamentals of fluid mechanics. 2. State, explain, and apply fluid mechanics equations. 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' 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.
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	62	**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, 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.

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 I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME202**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
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: 1. Identify the terminology and definitions associated with thermodynamics, review unit system, properties of a system such as density, pressure, temperature and specific heats. 2. Introduce a systematic steps for solving thermodynamic problems. 3. Understand the concept of energy and the definition of its various types, especially, internal energy of a system. 4. Understand the concept of heat and the way energy transfer by heat. 5. Define the concept of work. 6. Introduce the first law of thermodynamics and energy balance. 7. Define a control volume principle, including the transfer of mass and energy crossing the control surface. 8. Understand the concept of a pure substance, phase change, and projection of substance property line on PV, TV, and PT property diagram. 9. Demonstrate the procedures for determining thermodynamic properties of pure substances from tables of property data. 10. 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. 11. Apply the first law of thermodynamics on closed (fixed mass) system and develop the general energy balance applied to closed systems. 12. 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. 13. Apply energy balance for closed (fixed-mass) systems that involve heat and work interactions for pure substances, ideal gases, and incompressible substances. 14. Apply mass conservation principle to various systems including steady and unsteady flow control volumes. 15. 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. 16. Solve energy balance problems for common steady-flow devices such as nozzles, compressors, turbines, throttling valves, mixing chambers, and heat exchangers. 17. Introduce the second law of thermodynamics and identify valid processes as those that satisfy both the first and second laws of thermodynamics. 18. Define and thermal energy reservoirs, reversible and irreversible processes, and introduce the heat engines, refrigerators, and heat pumps. 19. Apply the second law of thermodynamics to theoretical cycles and develop absolute thermodynamic temperature scale. 20. Describe the Carnot cycle, and examine the Carnot principles, idealized Carnot heat engines, refrigerators, and heat pumps. 21. 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	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

الدراسية	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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**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, 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: An Engineering Approach, 7th Ed. McGraw Hill, 2011.	Yes
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

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 I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME203**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
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)	62	**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 (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	**Engineering Mathematics**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME204**				
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)	200		

الحمل الدراسي الكلي للطالب خلال الفصل	

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 Programming II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME205**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
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: 22. Use MATLAB to display data and equations graphically or in tabular form. 23. Write and execute MATLAB script files to solve math, science, and engineering-related problems. 24. Use loops, selection structures, and input/output commands in MATLAB. 25. Model data in MATLAB by curve-fitting with polynomials and by using interpolation. 26. Use MATLAB to solve a system of simultaneous equations, to find roots of polynomials, and to solve other single-variable equations. 27. Perform numerical integration and differentiation using MATLAB. 28. 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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**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

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	**ME206**				
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: 29. Distinguish between dependent, Independent, and Integrated essays. 30. Find the topic and the thesis statement of short essays. 31. Identify the main ideas from the introduction paragraph. 32. Identify the main ideas from the body paragraph. 33. Find the supporting details from the introduction paragraph. 34. Find the supporting details from the body paragraph. 35. Draw an outline to link the ideas, supporting details, and essay topic. 36. Make notes in response to an essay question to create main ideas, supporting details, and thesis statement. 37. Write the introduction paragraph on basis of the thesis statement and main ideas. 38. Build the body paragraphs based on main ideas and supporting details. 39. Write the introduction paragraph based on the main ideas. 40. 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.* ➢ *Louaheed, 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.
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	F – Fail	راسب	(0-44)	A significant amount of work is required.

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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	**5**			☐ **Lab**	
SWL (hr/sem)	**125**			☒ **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 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: 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	This course provides and deals with different types of liquids at different temperatures

المحتويات الإرشادية	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) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**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**	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.	Yes

	➢ **Fluid Mechanics,** Frank M. White., seventh edition, 2009, Mcgraw-Hill series in mechanical engineering.	
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	**5**				
SWL (hr/sem)	**125**				
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: 41. 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. 42. Apply the second law of thermodynamics to cycles and cyclic devices starting from idealized Carnot cycle including Carnot heat engines, refrigerators, and heat pumps. 43. Determine the expressions for the thermal efficiencies and coefficients of performance for reversible heat engines, heat pumps, and refrigerators. 44. 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. 45. 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. 46. 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, 47. Diesel, Brayton cycle. Brayton cycle with regeneration; and the Brayton cycle with intercooling, reheating, and regeneration. 48. 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	62	**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: An Engineering Approach, 7th Ed. McGraw Hill, 2011.	Yes
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	**5**				
SWL (hr/sem)	**125**				
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)	62	**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, 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

Module Information					
Module Title	**Mechanical Engineering Laboratory I**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME254**				
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	49. To apply knowledge of mathematics, science, and engineering 50. To design and conduct experiments, as well as to analyze and interpret data 51. To identify, formulate, and solve engineering problems 52. To communicate effectively as teamwork. 53. Recognition ability to engage in life-long learning 54. To use the techniques, skills, and modern engineering tools necessary for engineering practice
Module Learning	Upon successful completion of this course, students will be able to

Outcomes	1. 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. 2. Provide an experimental foundation for the theoretical concepts introduced in the lectures. Students have an opportunity to verify some of the ideas for themselves. 3. 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. 4. To learn how to write a technical report communicating scientific information clearly and concisely. 5. Understand the physical concept of different mechanical experiments.
Indicative Contents	Indicative content includes the following. Part A – Applied mechanics experiments [15 hrs] - - . Part B – Production and metallurgy experiments [20 hrs] - - . Part C – Thermal systems experiments [20 hrs] - - . Part D – Fluid mechanics experiments [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
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work 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	**ME255**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
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: 55. To further knowledge of computer generated engineering drawing. 56. To create, edit and print a variety of technical drawings using a CAD system. 57. To develop comeptence with office applications to communicate and demontstrate professional knowledge. 58. Decide on strategies to be used and assumptions that need to be made. 59. Use both algebraic and geometric approaches in problem-solving. 60. Develop a flexible and creative problem-solving ability. 61. Develop an integrated understanding of the mechanical drawing. 62. Examine intermediate results or other quantities that could be used to ensure a solution is physically reasonable. 63. Develop their ability to communicate ideas of science. 64. Identify what they don't understand, and ask specific questions in order to gain understanding. 65. Develop an expertise in experimental methodologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	16. 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. 17. Prepare free-hand multiview sketches of objects assigned by the instructor. 18. Create and insert symbols. 19. Specify and depict threads, fasteners and other hardware in a mechanical assembly. 20. Plot assembly drawings with certan scales. 21. 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. 22. Solve a practical engineering problem using basic scientific knowledge. 23. Use IT skills and software to source information, write technical reports, and make presentations. 24. Read and construct engineering drawings to a high standard. 25. Plan and complete a project on time. 26. Work effectively within a team to achieve a desired objective. 27. Use a range of basic metal fabrication tools. 28. Use a range of PCB assembly tools and basic test instruments. 29. Use an Integrated Development Environment for code generation for the PIC micro-controller. 30. Use Electronic CAD software to draw schematic diagrams. 31. Apply basic mechanical design principles. 32. 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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	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

Module Information					
Module Title	**Metallurgy**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME256**				
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	66. To develop the capacity of third-year students to recognize types of Binary alloy systems for ferrous metals & Ternary alloy systems. 67. To develop skills and an understanding of Alloy steels. 68. To enrich students' knowledge and develop their skills in alloy steels' heat treatments and engineering applications. 69. To understand the hardenability and surface hardening of steel. 70. To understand nonferrous metals and alloys and bearing metals. 71. To compare different types of strengthening mechanisms of metals. 72. Understand the failure of metals, the strengthening mechanisms, and the international specification of metals and alloys.
Module Learning	The course offers knowledge of applied metallurgy of binary alloy systems for ferrous

Outcomes	metals and ternary alloy systems. 6. Describe the alloy steels: alloying elements, heat treatments, and their engineering applications. 7. Evaluate the hardenability and surface hardening of metals. 8. Explains the nonferrous metals and alloys, and bearing materials. 9. Analyze the deformation and defects of metals. 10. Describe the strengthening mechanisms of metals. 11. 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		

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