MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics (I)**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E111**				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level	UGx11 1		**Semester of Delivery**	1	
Administering Department	MAE		**College**	ENGINEERING	
Module Leader	Mohammed Mustafa		**e-mail**	mohammed.abedlhafd@uobasrah.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	**This course reviews the basic ideas you need to start calculus for engineering, also for students intending to continue to more advanced courses in calculus and mathematics in general Topics include a brief review of functions, followed by discussion of limits, derivatives, and applications of differential calculus to real-world problem areas. An introduction to integration concludes the course, with a brief description of transcendental functions.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Knowledge and Understanding A1. Illustrate the principle of calculus. A2. Gain the required mathematical skills to solve different problems. A3. Improve the essential skills to treat with different mathematical problems. A4. Study the principal criteria for modelling any industrial system mathematically. B. Subject-specific skills B1. Ability to solve mathematical problems. B2. Ability to analyze and resolve any mathematical problem. B3. Writing scientific reports. B4. Gain the required experience to deal with industrial systems mathematically.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- The Cartesian Plane and Functions [10 hrs] The distance formula, lines, The slope and the equation of a line, Parallel and perpendicular lines, circles, Functions and their graphs, The Trigonometric Functions , Graphs of Trigonometric Functions. 2- The Limits and Continuity [15 hrs] Calculating Limits Using the Limit Laws, Properties of Limits, Limits of Trigonometric Function, Special Trigonometric Limits, L-Hopital's Rule Continuity, Properties of Continuous Function. 3- Differentiation [18 hrs] Definition of the Derivative, Differentiation Rules, Derivatives of Trigonometric Functions, The Chain Rule, Implicit Differentiation, Related Rates. 4- Applications of Differentiation [15 hrs] The First Derivative Test, Concavity and the Second Derivative Test, Curve Sketching, Optimization Problems, The mean value Theorem.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Reading and self-learning. • Training and activities during lecture. • HomeWorks. • Suggesting some websites for extra reading. • Discussions and workshops.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1.5 hr	20% (10)	7	LO # 1-7
	Final Exam	2hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

	Material Covered
Week 1	Point Sets and Intervals
Week 2	Inequalities
Week 3	The distance formula, lines, The slope and the equation of a line
Week 4	perpendicular lines, circles, Functions and their graphs
Week 5	The Trigonometric Functions, Graphs of Trigonometric Functions.
Week 6	Calculating Limits Using the Limit Laws, Properties of Limits,
Week 7	Limits of Trigonometric Function,
Week 8	Special Trigonometric Limits, L-Hopital's Rule Continuity, Properties of Continuous Function.
Week 9	Definition of the Derivative, Differentiation Rules
Week 10	Derivatives of Trigonometric Functions, The Chain Rule, Implicit Differentiation,
Week 11	Related Rates, The First Derivative Test,
Week 12	Concavity and the Second Derivative Test, Curve Sketching,
Week 13	Optimization Problems, The mean value Theorem.
Week 14	vectors in space, dot product, cross product
Week 15	Matrices and linear equations, Determinants, operation of Matrices.

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

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Howard Anton, Irl Bivens, Stephen Davis - Calculus_ Early Transcendentals-Wiley (2016)	Yes
Recommended Texts	Calculus-early-transcendentals-10th-ed-howard-anton-iril-bivens-stephen-davis-ebook	Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Drawing**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**E112**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGx11 2		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Dhia Chasib Ali		**e-mail**	dhai.ali@uobasrah.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	1. To develop problem solving skills and understanding of Manufacturing schemes 2. To understand projection, sectional views and Isometric Drawings 3. This course deals with the basic concept of Engineering Drawings 4. This is the basic subject for all Engineering schemes 5. To understand how to read Engineering Schemes for Design
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how to deals with Engineering Drawings 2. Study and understand engineering schemes in various fields 3. Express engineering ideas and solutions in a manner commensurate with the illustrations 4. Understand and apply the necessary parts to complement the various schemes 5. Proper implementation of maps and blueprints for engineering projects 6. Detect any error or deficiency in the plans of the various engineering projects.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Lines & Ellipse** Types of Lines – Ellipse Drawing – Engineering Operations (15 hrs) **Part B- Projection** Presentation of views – dimensions- sectional views (45 hrs) **Part C- Isometric Drawings** Isometric Drawings (15 hrs)

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments				
	Projects / Lab.	20	40%(40)	1-15	LO #1, 15
	Report				
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	2 hr	30% (30)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Types of lines
Week 2	Engineering Operations
Week 3	Ellipse Drawings
Week 4	Projections – types of projections
Week 5	Projection views
Week 6	Projection views
Week 7	Projection views
Week 8	Projection views

Week 9	Projection views
Week 10	Sectional Views
Week 11	Sectional Views
Week 12	Sectional Views
Week 13	Isometric Drawings
Week 14	Isometric Drawings
Week 15	Isometric Drawings
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Drawings Abd-Alrasol Alkhaffaf- University of Technology-Iraq-1990	Yes
Recommended Texts	Machine Drawings By k. L. Narayana, New age international Publishers - 1994	Yes
Websites		

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

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

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية					
Module Title	**Applied Sciences**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E113**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGx11 3	**Semester of Delivery**		1
Administering Department		Type Dept. Code	**College**		Type College Code
Module Leader	Munira Waheed Mahan		**e-mail**		munira.mahan@uobasrah.edu.iq

Module Leader's Acad. Title	Assistant 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	1. Provide a fundamental understanding of the principles and concepts of physics and chemistry and their application in engineering. 2. Develop students' scientific inquiry skills, critical thinking, and problem-solving abilities through hands-on laboratory experiments and practical demonstrations. 3. Foster an appreciation for the role of physics and chemistry in engineering disciplines and their impact on technological advancements. 4. Enhance students' understanding of the interrelationship between physics, chemistry, and engineering, and their ability to apply scientific principles to engineering problems. 5. Develop students' proficiency in experimental techniques, data analysis, and interpretation of scientific results. 6. Cultivate an awareness of safety protocols and ethical considerations in conducting scientific experiments and handling hazardous materials.
Module Learning Outcomes مخرجات التعلم للمادة	1. Demonstrate a deep understanding of the fundamental principles and concepts of physics and chemistry as applied to engineering disciplines. 2. Apply scientific reasoning, critical thinking, and problem-solving skills to analyze and solve complex engineering problems using principles from physics and chemistry.

الدراسية	3. Design and conduct experiments, analyze data, and draw appropriate conclusions while adhering to safety protocols and ethical considerations. 4. Utilize mathematical and computational tools to model and simulate physical and chemical phenomena in engineering applications. 5. Communicate scientific ideas and findings effectively, both orally and in written form, to technical and non-technical audiences. 6. Collaborate effectively in interdisciplinary teams, demonstrating teamwork and leadership skills in solving engineering problems that involve physics and chemistry. 7. Demonstrate an awareness of the environmental, societal, and ethical implications of engineering practices that involve physics and chemistry. 8. Adapt and apply knowledge of physics and chemistry to address emerging challenges and advancements in engineering fields. 9. Continuously engage in self-directed learning and professional development to stay abreast of new developments in the field of applied sciences. 10. Demonstrate an appreciation for the role of physics and chemistry in fostering innovation, sustainable development, and technological advancements in engineering.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Principles of Physics: Mechanics and motion, Thermodynamics, Waves and vibrations, Electricity and magnetism, Optics and light. [5 hrs] 2. Principles of Chemistry: Atomic structure and periodic table, Chemical bonding and molecular structure, Chemical reactions and stoichiometry, States of matter and phase transitions, Acids, bases, and pH. [5 hrs] 3. Laboratory Techniques: Safety protocols and laboratory procedures, Measurement and data analysis, Chemical synthesis and reactions, Spectroscopy and analytical techniques, Calibration and quality control. [5 hrs] 4. Engineering Applications: Material properties and their relationship to physics and chemistry, Energy conversion and conservation principles, Environmental impact and sustainability considerations, Introduction to nanotechnology and materials science,

	Electrochemistry and corrosion control. [5 hrs] 5. Computational Methods: Mathematical modeling and simulation techniques, Computational tools for data, analysis and visualization, Numerical methods for solving physics and chemistry problems, Computer-aided design and analysis software applications. [5 hrs] 6. Case Studies and Applications: wave in Pipes. Sound Waves: Power and intensity, relations of sound and temperature, Dopller Phenomenon. [5 hrs] Thermal Chemistry / Chemical Kinetics, Exthothermic And Endothermic Reaction, heat of Formation, fuel and Watergas, Rocket Propulsions, Energy and collision, Water Treatments, Petroleum Refining. [8 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Some common learning and teaching strategies include: 1. Traditional classroom lectures. Lectures may include multimedia presentations, demonstrations, and interactive discussions. 2. Practical laboratory sessions allow students to apply theoretical knowledge, develop experimental skills, and gain hands-on experience with scientific equipment and techniques. 3. Problem-solving Sessions: Facilitated problem-solving sessions encourage students to apply physics and chemistry principles to solve engineering problems. These sessions promote critical thinking, analytical skills, and the ability to apply theoretical knowledge in practical scenarios. Group Projects: Collaborative group projects enable students to work together on complex problems or research tasks. This encourages teamwork, communication, and the exchange of ideas while providing opportunities for students to apply physics and chemistry concepts in real-world contexts. Guest Lectures and Industry Visits: Inviting experts from the industry or academia as guest lecturers and organizing visits to relevant industries or research facilities exposes students to real-world applications of physics and chemistry.

	Online Resources and Learning Platforms: Utilizing online resources, interactive simulations, multimedia materials, and learning platforms enhance students' access to additional learning materials, promotes self-paced learning, and supports collaborative learning activities.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Atomic structure and Bonding, Chemical Bonding, Hybridization
Week 2	Electro-chemical Corrosion, Hydration Reaction.
Week 3	Thermal Chemistry / Chemical Kinetics, Exthothermic And Endothermic Reaction
Week 4	heat of Formation, fuel and Watergas, Rocket Propulsions, Energy and collision,
Week 5	Water Treatments, Petroleum Refining
Week 6	Hydrocarbons, Aromatic Compounds, Benzene Structure, Homologues of Benzene
Week 7	Reactions, Substitution of Benzene, Addition reaction, Poly-substitution in benzene ring, Reactions
Week 8	solids, crystalline solids types, crystalline structures, stress, strain
Week 9	Energy stored in stressed body
Week 10	Equation of Motion, pendulum, damping Motion
Week 11	Forced motion, Wave Motion
Week 12	longitudinal wave in Pipes
Week 13	Sound Waves: Power and intensity, relations of sound and temperature, Dopller Phenomeno.
Week 14	Dopller Phenomenon
Week 15	
Week 16	

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

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Applied Chemistry and Physics, Robert A. Burke, 1st Edition	No
Recommended Texts	Hand Book of Chemistry and Physics, W.M. Haynes	No
Websites	1. https://www.studocu.com/ph/document/western-mindanao-state-university/bs-psychology/applied-science-lecture-notes-1-10/22318862 2. https://www.youtube.com/watch?v=TRHny-fWcQw	

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية

Module Title	Engineering Mechanics /static			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE111**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx11 4		**Semester of Delivery**	1	
Administering Department	MAE		**College**	ENGINEERING	
Module Leader	AZZAM DAWOOD HASSAN		**e-mail**	AZZAM.HASSAN@UOBASRAH.EDU.IQ	
Module Leader's Acad. Title	ASST. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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	**The aim of studying Engineering mechanics which includes the basics of static and** **dynamic to provide the student with knowledge and ability to solve different engineering** **problems.**

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	. Explain the principles of static equilibrium 2. Use Free Body Diagrams to solve static problems involving components and pulley systems (P01, P02, P03, P04) 3. Solve problems relating to the forces in truss members using the method of joints and the method of sections. 4. Determine the centre of mass and centroids of Lines, areas and Volumes of simple and composite bodies 5. Solve problems relating to hydrostatics including pressures on submerged surfaces, buoyancy and stability of floating objects. 6. Solve problems relating to dry friction, including inclined planes and screw threads. 7. Solve problems relating to the work, equilibrium, potential energy and stability of a system 8. Undertake an experiment as part of a group and report results.
Indicative Contents المحتويات الإرشادية	Introduction to Engineering Mechanics, Operation with Forces, Force systems, components, moment: Resultant of Forces system Couple and Resultant, components, Equilibrium: Equilibrium in Two and Three Dimensions, free body diagram, Equilibrium Conditions. Centroids and Moments of Inertia: centroids of composite bodies, center of mass, Area moment of inertia, composite areas, radius of gyration, transfer of axes. Friction: frictional phenomena, applications. Trusses and Cables: Structures, Frame.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 5- Graduation projects.

	6- Scientific visits. 7- Seminars held in the department. 8- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Force system and components
Week 3	Resultant (analytic method)
Week 4	Resultant (parallelogram method)
Week 5	Moment
Week 6	Couple
Week 7	Equilibrium
Week 8	Centroid
Week 9	Discussion and solution of home works
Week 10	Moment of inertia
Week 11	Friction
Week 12	Structures
Week 13	Frame and machine
Week 14	Quiz
Week 15	Discussion

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

Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. J. L. Meriam and L. G. Kraige, 'Engineering Mechanics: Statics (V.1), 7th edition, Wiley 2012. 2. 2.R.C. Hibbeler, Engineering Mechanics: STATICS (Thirteenth Edition), Prentice Hall 2004	Yes
Recommended Texts		
Websites		

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

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	**Production Engineering**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE112**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGx11 5		**Semester of Delivery**	1	
Administering Department	Dept. of engineering materials		**College**	College of engineering	
Module Leader	Nuha Hadi Jasim		**e-mail**	Nuha.jasim@uobasrah.edu.iq	
Module Leader's Acad. Title	Assist. Pro. Dr.		**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	6. Understanding the mechanical properties of engineering materials and their significance in different applications. 7. Conducting mechanical tests such as tensile tests, impact tests, and hardness tests to assess material properties and behavior. 8. Understanding the production processes for ferrous metals, specifically cast iron and steel. 9. Studying different methods of producing cast iron, such as conversion, Martin method, and smelting electrolysis method. 10. Exploring the production methods for steel, including conversion, Martin method, and smelting electrolysis method. 11. Examining the production processes for non-ferrous metals, with a focus on copper, aluminum, lead, zinc, and tin. 12. Understanding the methods of purifying bauxite to obtain aluminum, including the use of electrolysis. 13. Studying the production methods for copper, including dry and wet methods. 14. Exploring the production processes for lead, zinc, and tin. 15. Learning about various methods used for forming plastic materials into desired shapes, such as injection molding, blow molding, and extrusion. 16. Gaining knowledge of ceramic materials and their properties. 17. Understanding the manufacturing processes used in the ceramic industry, including shaping, drying, firing, and glazing. 18. Exploring cold forming processes for metals, understanding the advantages, disadvantages, and properties associated with cold forming. 19. Studying hot forming processes for metals, including forging, rolling, and extrusion. 20. Understanding the properties of materials during hot forming and the effects of temperature and strain rate. 21. Understanding the principles of rolling processes, including shape rolling and calculating the forces involved in rolling operations. 22. Learning about different types of extrusion processes, such as direct extrusion, indirect extrusion, and impact extrusion. 23. Analyzing the power requirements in extrusion operations and understanding extrusion in most cone shapes. 24. Drawing Processes: 25. Exploring drawing processes, including multi-stage drawing, pipe drawing, and deep drawing. 26. Understanding the principles and techniques involved in drawing operations. 27. Welding Technology: 28. Gaining an understanding of welding processes, including the principles, techniques, and methods involved.

	29. Studying different welding methods, such as shielded metal arc welding, gas metal arc welding, gas tungsten arc welding, and submerged arc welding. 30. Casting Sandy: 31. Learning about casting processes, including the different types of casting molds and the inspection of castings. 32. Understanding centrifugal casting as a specific casting method. 33. Powder Metallurgy Principles: 34. Studying the principles and techniques of powder metallurgy, including powder production, powder mixing, compaction, sintering, and post-sintering operations. 35. Understanding the applications and advancements in powder metallurgy.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	7. Ability to identify and select appropriate engineering materials based on their mechanical properties and application requirements. 8. Competence in conducting mechanical tests, interpreting test results, and analyzing material behavior under different loading conditions. 9. Understanding the production processes for cast iron and steel, including the ability to evaluate the advantages and limitations of different methods. 10. Knowledge of the properties and characteristics of ferrous metals and their suitability for specific applications. 11. Familiarity with the production processes for copper, aluminum, lead, zinc, and tin, and the ability to analyze their properties and applications. 12. Understanding the methods used in the purification of bauxite for aluminum production. 13. Proficiency in selecting appropriate plastic forming methods based on the desired shape, complexity, and material properties. 14. Knowledge of the advantages, limitations, and applications of different plastic forming techniques. 15. Understanding the properties and characteristics of ceramic materials and their applications in various industries. 16. Competence in the manufacturing processes for ceramics, including shaping, drying, firing, and glazing. 17. Ability to apply cold forming techniques to shape and fabricate metallic components, considering the material properties and process limitations. 18. Knowledge of the advantages, disadvantages, and applications of cold forming processes. 19. Proficiency in utilizing hot forming processes such as forging, rolling, and extrusion to shape and modify metallic materials. 20. Understanding the effects of temperature and strain rate on material behavior during hot forming operations. 21. Competence in applying the principles of rolling to calculate forces, predict material behavior, and design rolling processes. 22. Understanding the factors that affect the quality and efficiency of rolling operations.

	23. Ability to select the appropriate extrusion method and analyze the power requirements for extrusion operations. 24. Knowledge of extrusion in different shapes and the factors influencing extrusion outcomes. 25. Competence in performing multi-stage drawing, pipe drawing, and deep drawing operations. 26. Understanding the principles and limitations of different drawing techniques. 27. Proficiency in applying welding principles and techniques to join metallic materials effectively and efficiently. 28. Knowledge of different welding methods and their advantages, limitations, and applications. 29. Understanding the casting processes, including the selection of casting molds and the inspection of castings for quality control. 30. Competence in applying centrifugal casting as a specific casting method. 31. Ability to utilize powder metallurgy techniques for the production of components and materials using powdered metals. 32. Knowledge of the different stages of the powder metallurgy process and the factors influencing the properties of the final product.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Engineering Materials (8 Hours**) Mechanical Properties for Engineering Materials , Mechanical Tests (Tensile Test, Impact Test Hardness Test) **Ferrous Metal production (8 Hours)** Production Cast Iron Production , Steel Production (Conversion method , Martin Method ,Smelting Electrolysis Method) **Non-Ferrous Metal Production (6 Hours)** Copper Metal Production (Dry method , Wet Method) Aluminum Metal Production (Methods of Purifying Bauxite for Aluminum , Using Electrolysis method) Metal Production of Lead , Zinc and Tin) **Plastic Industry (4 Hours)** (Methods of Forming Plastic) **Ceramic Industry** **Cold Forming Processes (4 Hours)** Advance and dis advance , Properties of Material in cold forming , **Hot Forming Processes (4 Hours)** Advance and dis advance , Properties of Material in cold forming , **Principles Rolling Processes (4 Hours)** Principle of Rolling ,Shape Rolling , Calculate force in Rolling Process, **Extrusion (4 Hours)** Direct Extrusion , Indirect Extrusion, Impact Extrusion ,Analysis of Power in the Extrusion Operations , Extrusion in Most Cone **Drawing Processes (4 Hours)** Multi-Stage Drawing, Pipe Drawing , Deep Drawing **Welding Technology (4 Hours)** The Principles of the Welding Process, Welding Techniques (Thermal Source, Sources of Mechanical, Chemical Sources) , Welding Method (Shielding Metal Arc Welding ,

	Gas Metal Arc Welding , Gas Tungsten Arc Welding ,Submerged Arc Welding) **Casting Sandy** **(4 Hours)** Casting Processes ,Types of Casting Mould , Casting Inspection ,Centrifugal Casting Powder Metallurgy principles

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. To effectively study and achieve the learning outcomes for the topics you mentioned, it is important to employ effective learning strategies. Here are some strategies you can consider: Set Clear Goals: Clearly define your learning goals for each topic. What specific knowledge, skills, or competencies do you want to acquire? Having clear goals will help you stay focused and motivated throughout your studies. Organize and Plan: Create a study plan or schedule that outlines the topics you need to cover and allocate specific time slots for each. This will help you manage your time effectively and ensure comprehensive coverage of the material. Utilize Different Learning Resources: Explore various learning resources such as textbooks, online articles, video tutorials, and lecture notes. Use a combination of these resources to gain a deeper understanding of the topics and reinforce your learning. Active Learning: Engage in active learning techniques such as summarizing concepts in your own words, discussing the topics with peers or instructors, and solving practice problems. Actively participating in the learning process enhances understanding and retention. Visual Aids and Diagrams: Use visual aids, diagrams, and flowcharts to simplify complex concepts and enhance your understanding. Visual representations can help you grasp relationships between different elements and improve information recall.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Engineering Materials** Mechanical Properties for Engineering Materials , Mechanical Tests (Tensile Test, Impact Test Hardness Test)
Week 2	**Ferrous Metal production** Production Cast Iron Production
Week 3	Steel Production (Conversion method , Martin Method ,Smelting Electrolysis Method)
Week 4	**Non-Ferrous Metal Production** Copper Metal Production (Dry method , Wet Method)
Week 5	Aluminum Metal Production (Methods of Purifying Bauxite for Aluminum , Using Electrolysis method) Metal Production of Lead , Zinc and Tin)

Week 6	**Plastic Industry** (Methods of Forming Plastic)
Week 7	**Ceramic Industry** **Cold Forming Processes** Advance and dis advance , Properties of Material in cold forming ,
Week 8	**Hot Forming Processes** Advance and dis advance , Properties of Material in cold forming ,
Week 9	**Principles Rolling Processes** Principle of Rolling ,Shape Rolling , Calculate force in Rolling Process,
Week 10	**Extrusion** Direct Extrusion , Indirect Extrusion, Impact Extrusion ,Analysis of Power in the Extrusion Operations , Extrusion in Most Cone
Week 11	**Drawing Processes** Multi-Stage Drawing, Pipe Drawing , Deep Drawing
Week 12	Complex Frequency, s-Plane, Poles and Zeros, Response Function, Bode Plots
Week 13	**Welding Technology** The Principles of the Welding Process, Welding Techniques (Thermal Source, Sources of Mechanical, Chemical Sources) ,
Week 14	Welding Method (Shielding Metal Arc Welding , Gas Metal Arc Welding , Gas Tungsten Arc Welding ,Submerged Arc Welding)
Week 15	**Casting Sandy** Casting Processes ,Types of Casting Mould , Casting Inspection ,Centrifugal Casting
Week 16	Powder Metallurgy principles

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	-Milling Workshop
Week 2	-Turning Workshop
Week 3	- Drilling Workshop
Week 4	- Welding Workshop
Week 5	- Carpentry Workshop
Week 6	- Casting Workshop
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the**

		Library?
Required Texts		Yes
Recommended Texts	Beitz, W., Pahl, G., & Grote, K. (1996). Engineering design: a systematic approach. *Mrs Bulletin*, *71*.	No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Electrical and Electronic Material**	**Module Delivery**
Module Type	**Basic learning activities**	☐ **Theory**

Module Code	**MAE113**			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGx11 6	**Semester of Delivery**		1
Administering Department		MAE	**College**	Engeneering	
Module Leader	Esraa Habeeb Kadhim		**e-mail**	esraa.kadham@uobasrah.edu.iq	
Module Leader's Acad. Title		Leacturer	**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	The purpose of study the course of Electrical and Electronic Material is to focus on the important relation between the electical and electronic effectes and the types of Materials , to make students know the type of electrical properties materials and its behaver and also the electronic type of material , the stracture which is make its electrical properties like **Atoms, Molecules, and Ions**, **Molar Mass**, also Early Ideas in Atomic Theory, The Modern View of Atomic Structure , **Superconductors** and its applications , **Conductors, Insulators and Coulomb's law and Electron theory on conductor, insulator and semiconductor and also Energy Band Structures and Bonding(metals, semiconductors, insulators)**
Module Learning	

Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity efffects on materials . 2. Define Atomic Theory . 3. Explain the reaction and involvement of atoms on different types of materials 4. Describe the Electrical Resistivity and its calculation for defferint types of Materials. 5. Identify the Tamperture effect on resistivity and conductivity . 6. Discuss the metals as a good conductors or good insulaters and good semiconductors . 7. Discuss the various properties electronic materials . 8. Explain the capacitive proparties an inductive properties of materials . 9. Explain of Superconductors .its types , properties and behavers . 10. Study the types of Electronics junctions according to the type of materials
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Electrical Materials</u> – Atoms, Molecules and Ions diffentions, distinguish between atoms and molecules; define isotopic mass, atomic mass, and molecular mass , list important features of Dalton's atomic theory , The Electron , The Discovery of the Nucleus , Atomic Number, Electrons, Mass Number, and Isotopes, Electrical properties depending on the structure of material (Lenght and cross sectional area) [15 hrs] _ Electrical Conductivity. Capacitance and inductance properties of materials , energy storage elements,Conductors ,Semiconductor and Insulaters . [15 hrs] _ Superconductivity and its applications for different types of metals . [10 hrs] _Effect of Temperature on Resistance ,Electrical Field , Electrical charge , Coulomb's Law, Charging By Contact, Systematic Measurement Electric Charge,the distrbution of electrical charge [15 hrs] _Revision problem classes [6 hrs] <u>Part B – Electronics Materials</u> _ Fundamentals Magnatic Flux , Magnatic Flux Density ,Type of Magnatic Materials The Magnatic Properties of Materials Magnetic Properties of Solids . [15 hrs], _ PN Junction, Biasing a PN Junction for different Materials , Space Charge Region (SCR), Energy Band Alignment, Shockley equation, Depletion approximation, P-N junction Example, Diode's Current/Voltage Characteristic, PN Junction current, Capacitive effects in the PN junction [15 hrs] _ Revision problem classes [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Self-learning through homework and mini-projects within the lectures. 3- Laboratories. 5- Graduation projects. - Scientific visits.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Atoms, Molecules and Ions diffentions, distinguish between atoms and molecules,

	energy storage elements,Conductors ,Semiconductor and Insulaters
Week 2	define isotopic mass, atomic mass, and molecular mass , list important features of Dalton's atomic theory
Week 3	The Electron , The Discovery of the Nucleus , Atomic Number, Electrons, Mass Number, and Isotopes, Electrical properties depending on the structure of material (Lenght and cross sectional area)
Week 4	Electrical Conductivity
Week 5	Capacitance and inductance properties of materials
Week 6	Review of Inductor and Capacitor as Circuit Elements, Source-free RL and RC Circuits, Transient Response
Week 7	Superconductivity and its applications for different types of metals
Week 8	Effect of Temperature on Resistance ,Electrical Field , Electrical charge
Week 9	Coulomb's Law, Charging By Contact
Week 10	Systematic Measurement Electric Charge,the distrbution of electrical charge
Week 11	Fundamentals Magnatic Flux , Magnatic Flux Density ,Type of Magnatic Materials
Week 12	Type of Magnatic Materials The Magnatic Properties of Materials Magnetic Properties of Solids
Week 13	PN Junction, Biasing a PN Junction for different Materials , Space Charge Region (SCR), Energy Band Alignment
Week 14	Shockley equation, Depletion approximation
Week 15	P-N junction Example, Diode's Current/Voltage Characteristic, P-N Junction current, Capacitive effects in the P-N junction
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction electrical circuit
Week 2	Lab 2: how to use electrical and electronic instruments
Week 3	Lab 3: kirchhoffs laws
Week 4	Lab 4: finding Max. Power transfer
Week 5	Lab 5: the Measurement of resistivity and conductivity
Week 6	Lab 6:Example of (semiconductors) P-N JUNCTION (Diode)

Week 7	Lab 7: Example of (semiconductors) P-N JUNCTION (Transistors)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Electrical Technology	Yes
Recommended Texts	Magnatism and Electro-magnatism	Yes

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Mathematics (II)**	**Module Delivery**
Module Type	Basic learning activities	☒ **Theory**

Module Code	**E121**			☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level		UGx11 7	**Semester of Delivery**		2
Administering Department		MAE	**College**	ENGINEERING	
Module Leader	Mohammed Mustafa		**e-mail**	mohammed.abedlhafd@uobasrah.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	An introduction to integration concludes the course, with a brief description of transcendental functions. This is the second course in calculus, intended for students who have already completed a Calculus I course in limits, differential and integral calculus, and need to extend their skills in this subject. It includes applications of integration, integration techniques with numerical integration and concludes with a brief description of polar coordinates.
Module Learning	A- Knowledge and Understanding

Outcomes مخرجات التعلم للمادة الدراسية	A1. Illustrate the principle of calculus. A2. Gain the required mathematical skills to solve different problems. A3. Improve the essential skills to treat with different mathematical problems. A4. Study the principal criteria for modelling any industrial system mathematically. B. Subject-specific skills B1. Ability to solve mathematical problems. B2. Ability to analyze and resolve any mathematical problem. B3. Writing scientific reports. B4. Gain the required experience to deal with industrial systems mathematically.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Integration [15 hrs] The Definite Integral, Basic Integration Rules, Integration of Trigonometric Functions, The Area under the Curve, The Natural Logarithmic Function, The Derivative and Integration of Natural Logarithmic Function, First Law of Calculus, and The mean value Theorem for Integral. 2- Inverse Functions [10 hrs] Exponential Functions, Rules and Properties of the Exponential Functions, The Derivative and Integration of Exponential Function, The Exponential Function for Bases other Than (e) (a" and log.), Derivative and Integration the Exponential Function for Bases other Than (e), Inverse Trigonometric Functions, Derivative and Integration of Trigonometric Functions, and Hyperbolic Function 3- Applications of Integration [15 hrs] Area Between two curves, The Volume by using the Disk Method, The volume by using Washer method, Volumes by Cylindrical Shells, Solids with Known Cross Sections, Lengths of Plane Curves, and Areas of Surfaces of Revolution. 4- Integration Techniques [12 hrs] Basic Integration Formulas, Integration by Parts, Trigonometric Integrals Trigonometric Substitutions, Integration of Rational Functions by Partial Fractions. 5- Numerical Integration [2 hrs] The Trapezoidal Rule, The Simpson's Rule. 6- Polar Coordinates [4 hrs] Graphing in Polar Coordinates, Areas in Polar Coordinates, Lengths in Polar Coordinates.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Reading and self-learning. • Training and activities during lecture. • HomeWorks. • Suggesting some websites for extra reading. • Discussions and workshops.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1.5 hr	20% (10)	7	LO # 1-7
	Final Exam	2hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The Definite Integral, Basic Integration Rules, Integration of Trigonometric Functions, The Area under the Curve,
Week 2	The Natural Logarithmic Function, The Derivative and Integration of Natural Logarithmic Function,
Week 3	First Law of Calculus, and The mean value Theorem for Integral.
Week 4	Rules and Properties of the Exponential Functions, The Derivative and Integration of Exponential Function
Week 5	The Exponential Function for Bases other Than (e) (a" and log.), Derivative and Integration the Exponential Function for Bases other Than (e),
Week 6	Inverse Trigonometric Functions, Derivative and Integration of Trigonometric Functions, and Hyperbolic Function
Week 7	Inverse Hyperbolic Functions, Derivative and Integration of Hyperbolic Function
Week 8	Area Between two curves, The Volume by using the Disk Method,
Week 9	The Volume by using Washer method, Volumes by Cylindrical Shells,
Week 10	Solids with Known Cross Sections, Lengths of Plane Curves, Areas of Surfaces of Revolution.
Week 11	Basic Integration Formulas, Integration by Parts
Week 12	Trigonometric Integrals, Trigonometric Substitutions,
Week 13	Integration of Rational Functions by Partial Fractions.
Week 14	The Trapezoidal Rule , The Simpson's Rule, Graphing in Polar Coordinates
Week 15	Areas and Lengths in Polar Coordinates.

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

Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Howard Anton, Irl Bivens, Stephen Davis - Calculus_ Early Transcendentals-Wiley (2016)	Yes
Recommended Texts	Calculus-early-transcendentals-10th-ed-howard-anton-iril-bivens-stephen-davis-ebook	Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Mechanics /dynamic			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE121**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx118		**Semester of Delivery**	2	
Administering Department	MAE		**College**	ENGINEERING	
Module Leader	AZZAM DAWOOD HASSAN		**e-mail**	AZZAM.HASSAN@UOBASRAH.EDU.IQ	
Module Leader's Acad. Title	ASS/*St*. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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	**The aim of studying Engineering mechanics which includes the basics of static and dynamic to provide the student with knowledge and ability to solve different engineering problems.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understanding basics of the dynamics Analysis of dynamics of particles and rigid body Application of principles of work-Energy and Impulse-momentum in the dynamic analysis Having information about the kinetic analysis of rigid bodies in three dimensions.
Indicative Contents المحتويات الإرشادية	Introduction to dynamics: Newton's Law, gravitation Kinematics of particles: rectilinear motion, curvilinear motion, rectangular coordinates, projectiles, normal and tangential coordinate, polar coordinate, relative motion, constraint motion of connected particles(pulleys), Kinetics of Particles: Force and Acceleration, forces in rectilinear and curvilinear motion Work and kinetic Energy: Potential energy and power, Impulse and Momentum, Impact Dynamic of Rigid Bodies:Fixed axis rotation, Translations motion and general plane motion

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects. 6- Scientific visits. 7- Seminars held in the department. 8- Summer training.

	Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Kinematics-Rectilinear motion
Week 3	Kinematics-Erratic motion
Week 4	Kinematics-Projectile motion
Week 5	Kinematics-Curvilinear motion
Week 6	(Rectangular components)
Week 7	Kinematics-curvilinear motion
Week 8	(normal and tangential components)
Week 9	Absolute dependent motion
Week 10	Relative motion
Week 11	Discussion and solution of home works
Week 12	Kinetic-Force, mass, acceleration (rectilinear motion
Week 13	Kinetics Force, mass, acceleration (curvilinear motion)
Week 14	Work and energy
Week 15	Impulse and momentum

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

Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. J. L. Meriam and L. G. Kraige, 'Engineering Mechanics: dynamic (V.1), 7th edition, Wiley 2012. 2. 2.R.C. Hibbeler, Engineering Mechanics: dynamic (Thirteenth Edition), Prentice Hall 2004	Yes
Recommended Texts		
Websites		

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

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	**Materials Extraction Technology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE122**				
ECTS Credits	6				
SWL (hr/sem)	**150**				
Module Level		UGx11 9	**Semester of Delivery**		2
Administering Department		Material	**College**	Engineering	
Module Leader	Zainab S.Abdulhassan		**e-mail**	Zainab.abdulhassan@uobasrah.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	The objective of this course is to introduce students to fundamental area of materials extraction technology which enables students to focus on the study of raw materials, sources of minerals in nature and mineral processing. These principals allow the students to be in complete knowledge about the extraction techniques and selecting the suitable methods for extraction .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The principle knowledge Minerals ore and Mineral processing 2. Explain the commination method of Minerals ore. 3. Discuss the various types of mills. 4. Discuss the Industrial screening. 5. Describe the principle of classification. 6. Describe the Dense medium separation and forth flotation. 7. Discuss the operations of magnetic and electric separation. 8. Describe the agglomeration process. 9. Identify thermal method for extraction. 10. An ability to select the suitable methods for extraction
Indicative Contents المحتويات الإرشادية	

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

Student Workload (SWL) الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	1	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.				
	Report				LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	25% (25)	7	LO # 1-7
	Final Exam	2hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Minerals, Sources of minerals in nature, Deposits and ore, Grade of minerals, minerals processing
Week 2	Removal of harmful materials, Ore Transportation, Ore storage ,Feeding ,sampling
Week 3	Energy consumed in commination, Crushing, primary crushers, secondary crushers
Week 4	Types of mills, motion of charge
Week 5	Screening performance, screen types, screening surfaces
Week 6	Principles of classification ,Types of classifiers
Week 7	Principal of process , Dense medium types, separating vessels
Week 8	Principles of flotation ,collectors, forthers, regulators
Week 9	Magnetism in minerals, types of magnetic separator
Week 10	Principles of separation , types of electrical separators
Week 11	Sintering ,pelletizing

Week 12	Removal of solid particles from gases, cyclone classifier , multi cyclones classifiers
Week 13	Roasting, sulfurization, carburization
Week 14	Electrolytic refining, metallurgical water methods
Week 15	Tailings dams, reprocessing and reuse of tailings , submarina disposal
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1) Wills 'Mineral Processing Technology, Eighth Edition by Barry A.Wills, James A. Finch, FRSC, FCIM,P.Eng. 2) Mineral Processing Technology, Seventh edition, by Barry A. Wills, Tim Napier-Munn.	no
Recommended Texts		
Websites		

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

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

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

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية				
Module Title	Human Rights and Democracy Concepts		**Module Delivery**	
Module Type	**B**		☐ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**U123**			
ECTS Credits	**4**			
SWL (hr/sem)	**75**			
Module Level	UGx11 10		**Semester of Delivery**	2
Administering Department	Type Dept. Code		**College**	Type College Code
Module Leader			**e-mail**	

Module Leader's Acad. Title		**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	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	Knowledge Acquisition: Provide students with a comprehensive understanding of the concepts, principles, and theories related to human rights and democracy. The aim is to ensure that students have a solid foundation of knowledge in these areas. Critical Thinking: Foster critical thinking skills by encouraging students to analyze, evaluate, and question various aspects of human rights and democracy. The aim is to develop their ability to think critically about complex issues and engage in thoughtful discussions. Awareness of Human Rights Violations: Raise students' awareness of human rights violations and abuses occurring globally. The aim is to sensitize students to the importance of protecting human rights and promote empathy towards those affected by violations. Understanding of Democratic Values: Develop an understanding of the core values and principles of democracy, such as equality, freedom, justice, and the rule of law. The aim is to help students appreciate the significance of democratic systems and their impact on society. Application of Human Rights Principles: Enable students to apply human rights

	principles and concepts to real-world situations and dilemmas. The aim is to enhance their ability to analyze and address human rights challenges in practical contexts. Ethical Considerations: Explore ethical dilemmas and challenges related to human rights and democracy, encouraging students to reflect on the ethical implications of decisions and actions. The aim is to foster a sense of ethical responsibility and integrity.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	When teaching a module on human rights and democracy concepts, the following learning outcomes can be targeted: Knowledge of Human Rights: Develop a comprehensive understanding of the principles, concepts, and historical background of human rights, including international human rights instruments and treaties. Understanding of Democracy: Gain a deep understanding of the fundamental principles, values, and mechanisms of democracy, including the rule of law, political participation, accountability, and transparency. Awareness of Human Rights Violations: Develop awareness of various human rights violations and abuses that occur globally, including discrimination, torture, gender inequality, freedom of expression restrictions, and violations of civil and political rights. Critical Analysis: Enhance critical thinking skills by analyzing and evaluating different perspectives, debates, and controversies related to human rights and democracy, including cultural relativism and the balance between individual rights and collective interests.
Indicative Contents المحتويات الإرشادية	Fundamental of freedom [2hr] Intellectual freedom and cultural Freedom of politics, Economic and Social freedom [2hr] The future of public freedoms Universal Declaration of Human Rights and Freedoms[2hr] Freedom in Islam [2hr] A brief explanation of the types of democracy. Democracy and the entrance to it. [2hr] Applications of democracy. [2hr] Administrative and financial corruption Democracy in Islam [4hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional classroom lectures provide theoretical knowledge and introduce key concepts, principles, and theories in computer science. Lectures may include multimedia presentations, demonstrations, and interactive discussions. 2. Practical Programming Exercises: Hands-on programming exercises and coding assignments allow students to apply theoretical concepts and develop their programming skills. These exercises may involve problem-solving, algorithm implementation, and software development. 3. Group Projects and Collaborative Learning: Group projects and collaborative learning activities promote teamwork, communication, and the exchange of ideas. Students work together on larger projects, such as developing software applications, to apply their knowledge and skills in a real-world context. 4. Problem-Solving Sessions: Facilitated problem-solving sessions provide students with opportunities to solve complex programming or algorithmic problems. These sessions promote critical thinking, analytical skills, and the ability to apply theoretical knowledge to practical scenarios. 5. Laboratory Sessions: Practical laboratory sessions allow students to gain hands-on experience with computer hardware, software, and tools. These sessions may involve conducting experiments, configuring networks, or working with specialized software applications. 6. Assessments and Examinations: Regular assessments, including quizzes, tests, and examinations, evaluate students' understanding of the subject matter and their ability to apply concepts and solve problems. 7. Research and Independent Study: Encouraging research projects and independent study allows students to explore specific areas of interest within computer science and develop their research skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	28	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Fundamental of freedom**
Week 2	**Intellectual freedom and cultural**
Week 3	**Freedom of politics, Economic and Social freedom**
Week 4	**The future of public freedoms.**

Week 5	**Universal Declaration of Human Rights and Freedoms**
Week 6	**Freedom in Islam**
Week 7	**A brief explanation of the types of democracy.**
Week 8	**Democracy and the entrance to it.**
Week 9	**Applications of democracy.**
Week 10	**Administrative and financial corruption**
Week 11	**Democracy in Islam**.
Week 12	
Week 13	
Week 14	
Week 15	
Week 16	

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

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

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

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

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

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

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية					
Module Title	**Computer Sciences**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**U122**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGx11 11	**Semester of Delivery**		2
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Munira Waheed Mahan		**e-mail**	munira.mahan@uobasrah.edu.iq	
Module Leader's Acad. Title		Assistant 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	1. Develop proficiency in programming languages, algorithms, and data structures. 2. Foster critical thinking and problem-solving skills for designing efficient and reliable software solutions. 3. Cultivate an understanding of computer architecture, operating systems, and network fundamentals. 4. Promote software engineering practices, including software design, development, testing, and maintenance. 5. Enhance knowledge of database systems, data management, and data analysis techniques. 6. Enable students to explore emerging areas of computer science, such as artificial intelligence, machine learning, and cybersecurity. 7. Prepare students for successful careers in various computer science roles, as well as for advanced study and research in the field.
Module Learning Outcomes مخرجات التعلم للمادة	1. Demonstrate a comprehensive understanding of the fundamental concepts, theories, and principles of computer science. 2. Apply programming languages, algorithms, and data structures effectively to design and develop software solutions. 3. Analyze and solve complex problems by utilizing appropriate computational and algorithmic techniques.

الدراسية	4. Demonstrate proficiency in software engineering practices, including software design, development, testing, and maintenance. 5. Utilize computer architecture and operating systems knowledge to optimize system performance and ensure efficient resource utilization. 6. Design and manage relational and non-relational databases, including data modeling, querying, and data management. 7. Apply machine learning and artificial intelligence techniques to solve real-world problems and make data-driven decisions. 8. Employ effective cybersecurity measures to protect computer systems and data from unauthorized access or malicious activities. 9. Collaborate effectively in interdisciplinary teams, demonstrating teamwork, communication, and leadership skills in software development projects. 10. Demonstrate ethical awareness and understanding of legal and societal implications in the field of computer science.
Indicative Contents المحتويات الإرشادية	1. Programming Fundamentals: Introduction to programming languages, Variables, data types, and operators Control structures (loops, conditionals),Functions and modular programming Arrays and data structures. [6 hrs] 2. Algorithms and Data Structures: Analysis of algorithms and algorithmic efficiency, Sorting and searching algorithms Linked lists, stacks, queues, and trees, Graph algorithms and traversal techniques Hashing and hash tables. [6 hrs] 3. Software Engineering: Software development life cycle, Requirements analysis and specification Software design patterns and principles,Testing and quality assurance, Software maintenance and documentation. [6 hrs] 4. Computer Architecture and Operating Systems: Computer organization and architecture, Memory management and virtual memory, Process management and scheduling, File systems and storage management, Operating system principles and functions. [6 hrs] 5. Database Systems: Relational database concepts, Database design and normalization, Transaction management and concurrency control. [6 hrs] Non-relational databases 6. Revision problem classes [8 hrs]
Learning and Teaching Strategies	

استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional classroom lectures provide theoretical knowledge and introduce key concepts, principles, and theories in computer science. Lectures may include multimedia presentations, demonstrations, and interactive discussions. 2. Practical Programming Exercises: Hands-on programming exercises and coding assignments allow students to apply theoretical concepts and develop their programming skills. These exercises may involve problem-solving, algorithm implementation, and software development. 3. Group Projects and Collaborative Learning: Group projects and collaborative learning activities promote teamwork, communication, and the exchange of ideas. Students work together on larger projects, such as developing software applications, to apply their knowledge and skills in a real-world context. 4. Problem-Solving Sessions: Facilitated problem-solving sessions provide students with opportunities to solve complex programming or algorithmic problems. These sessions promote critical thinking, analytical skills, and the ability to apply theoretical knowledge to practical scenarios. 5. Laboratory Sessions: Practical laboratory sessions allow students to gain hands-on experience with computer hardware, software, and tools. These sessions may involve conducting experiments, configuring networks, or working with specialized software applications. 6. Assessments and Examinations: Regular assessments, including quizzes, tests, and examinations, evaluate students' understanding of the subject matter and their ability to apply concepts and solve problems. 7. Research and Independent Study: Encouraging research projects and independent study allows students to explore specific areas of interest within computer science and develop their research skills.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Problem solving algorithms** Data structures, searching and sorting algorithms
Week 2	**Basic Variables** Variable types, Variable Names, Declarations
Week 3	**Assignment statements and expressions in V. Basic** Logical expressions and operators, Mathematical expressions and operators
Week 4	**Conditional Decisions and Loops** **1-Conditional Decisions** If/Then/End If statement, If/Then/Else/End If statement
Week 5	If/Then/ElseIf/End If statement, Select Case statement, Switch statement, IIf

	statement**,** Choose statement
Week 6	2-**Loops** For-Next statement, While-Wend statement, Do Until-Loop statement, Do While-Loop statement, Do-Loop Until statement, Do-Loop While statement
Week 7	**ARRAYS** Declaring Arrays , Input and Output Arrays, Generate Specific Array Elements
Week 8	Computational (mathematical) processes that take place on the matrices (arrays)
Week 9	Review of basic instructions of V. Basic to prepare for advanced V. basic
Week 10	Built in Functions, User defined functions and subroutines
Week 11	Sequential files, Random Files
Week 12	Flowcharts: symbols, conversion algorithm to Flowchart
Week 13	Flowcharts: loops, overlaps
Week 14	Engineering applications, start writing the matter to write the program
Week 15	Application for Student
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Steps to create, compile and implement a program using Microsoft visual Basic 6.0
Week 2	Lab 2: Implement programs for conditional statements (if-statement)
Week 3	Lab 3: Implement programs for conditional statements (switch-statement)
Week 4	Lab 4: Implement programs for Loop statements (for-statement)
Week 5	Lab 5: Implement programs for conditional statements (while-statement, do-while-statement)

Week 6	Lab 6: Implement programs for Array (one dimension)
Week 7	Lab 7: Implement programs for Array (two-dimension)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction: Visual Basic 6.0	No
Recommended Texts	Visual Basic .NET Notes for Professionals book	No
Websites	1. https://www.studocu.com/row/document/kca-university/network programming/intro-to-programming-lecture-notes-1/23829205 2. https://www.studocu.com/row/document/kings-university-college/visual-basic-programming/lecture-note-1/50754796 3. https://freecomputerbooks.com/Visual-Basic-Wikibooks.html	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	English / Technical			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**U123**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGx11 12	**Semester of Delivery**		2
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Name		**e-mail**	E-mail	

Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**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	Developing Language Skills: The primary aim is to enhance students' language skills in English, with a particular focus on technical vocabulary, grammar, reading comprehension, writing, speaking, and listening. The goal is to enable students to effectively communicate and understand technical information in English. Building Technical Vocabulary: Technical English courses aim to expand students' technical vocabulary related to specific fields or industries. This includes introducing and practicing specialized terminology, abbreviations, acronyms, and jargon commonly used in technical contexts. Enhancing Reading Comprehension: Technical English modules aim to improve students' ability to comprehend and analyze technical texts, such as manuals, reports, scientific articles, and technical documentation. Students learn to extract relevant information, understand the structure and organization of technical texts, and identify key concepts. Developing Writing Skills: Teaching technical English often emphasizes developing students' technical writing skills. This involves teaching them how to write clear, concise, and coherent technical documents, such as reports,

	proposals, emails, and project documentation. Emphasis may be placed on formatting, style, organization, and using appropriate language for technical communication. Practicing Oral Communication: The module aims to enhance students' ability to communicate effectively in technical contexts through oral presentations, discussions, and conversations. This includes improving pronunciation, fluency, and the ability to convey complex technical information clearly and accurately. Fostering Intercultural Communication: Technical English courses may aim to foster students' intercultural communication skills by exposing them to different cultural perspectives and communication styles within technical settings. This helps students develop awareness and sensitivity to cultural differences that may impact technical communication in international or multicultural environments. Developing Critical Thinking: Teaching technical English can aim to cultivate students' critical thinking skills, encouraging them to analyze and evaluate technical information, arguments, and evidence. This includes promoting problem-solving abilities, logical reasoning, and the ability to make informed decisions based on technical data. Promoting Autonomous Learning: Technical English modules may aim to empower students to become independent and self-directed learners. This involves providing them with strategies and resources for self-study, encouraging them to take responsibility for their learning, and fostering lifelong learning habits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Language Proficiency: Students should demonstrate an improved level of proficiency in technical English, including vocabulary acquisition, grammar usage, and the ability to understand and produce technical texts. Technical Vocabulary: Students should be able to comprehend and use technical vocabulary relevant to their field of study or industry, including specialized terminology, abbreviations, acronyms, and jargon. Reading Comprehension: Students should exhibit enhanced reading comprehension skills when engaging with technical texts, such as manuals, reports, scientific articles, and technical documentation. They should be able to extract key information, identify main ideas, and understand the overall structure and purpose of the texts. Writing Skills: Students should demonstrate the ability to produce clear, concise, and well-structured technical documents. This includes reports, proposals, emails, and other forms of written communication commonly used in technical

	contexts. Oral Communication: Students should be able to communicate effectively in technical settings, including giving presentations, participating in discussions, and engaging in conversations related to technical topics. They should be able to articulate ideas clearly, use appropriate technical language, and respond appropriately to questions or comments. Intercultural Communication: Students should develop intercultural communication skills, demonstrating an understanding of cultural differences and the ability to adapt their communication style in multicultural technical environments. Critical Thinking: Students should exhibit critical thinking skills by analyzing and evaluating technical information, arguments, and evidence. They should be able to apply logical reasoning and problem-solving strategies to make informed decisions based on technical data. Independent Learning: Students should demonstrate the ability to engage in self-directed learning, utilizing strategies and resources to further develop their technical English skills beyond the module. They should take responsibility for their learning and demonstrate a commitment to lifelong learning.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Technical Vocabulary and Terminology: Introduction and practice of technical vocabulary and terminology relevant to the field of study or industry. This may include word lists, glossaries, and exercises to reinforce understanding and usage. [10 hrs] Grammar and Language Skills: Review and practice of grammar structures commonly used in technical English, such as tenses, passive voice, conditionals, and sentence structures specific to technical writing. Language skills development may include pronunciation, intonation, and stress patterns. [10 hrs] Reading Comprehension: Strategies and exercises to enhance reading comprehension of technical texts. This may involve analyzing text structure, identifying main ideas, understanding technical diagrams or charts, and extracting relevant information. [10 hrs] Writing Technical Documents: Instruction and practice in writing various technical documents, such as reports, proposals, memos, emails, and technical documentation. Focus areas may include formatting, organization, clarity, and conciseness. [10 hrs] Speaking and Listening in Technical Contexts: Activities and exercises to develop oral communication skills in technical settings. This may include giving presentations, engaging in discussions, conducting interviews, and participating

	in role plays related to technical topics. [10 hrs] Technical Communication Skills: Instruction and practice in effective technical communication strategies, including conveying complex ideas clearly and accurately, using appropriate tone and register, and adapting communication to specific audiences or purposes. [10 hrs] Understanding Technical Texts: Analysis and comprehension of different types of technical texts, such as manuals, scientific articles, research papers, and industry-specific documents. This may involve close reading, summarizing, and critically evaluating technical information. [10 hrs] Intercultural Communication: Exploration of cultural factors and their impact on technical communication. This may include discussing cultural differences in communication styles, etiquette, and norms within technical environments, especially in international or multicultural contexts. [10 hrs] Critical Thinking and Problem-Solving: Developing critical thinking skills to analyze and evaluate technical information, arguments, and evidence. Students may engage in activities that require logical reasoning, problem-solving, and decision-making based on technical data. [10 hrs] Independent Learning Strategies: Introduction to resources, tools, and strategies for self-directed learning beyond the module. This may include guidance on using online resources, dictionaries, specialized databases, and practicing technical English in real-world contexts. [10 hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem)	38	**Unstructured SWL (h/w)**	

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	• Introduction to the module and course overview • Diagnostic assessment to assess students' language proficiency and technical English skills • Introduction to technical vocabulary and terminology in the field of study or industry • Grammar review: Present tenses and their usage in technical contexts
Week 2	• Reading comprehension strategies for technical texts • Practice exercises on understanding and extracting information from technical documents • Introduction to technical writing: Formatting and structure of technical reports • Grammar focus: Passive voice in technical writing
Week 3	• Developing writing skills for technical documents: Writing effective introductions and conclusions • Practice exercises on summarizing and paraphrasing technical information • Listening activities related to technical presentations and discussions • Speaking practice: Giving short technical presentations on familiar topics

Week 4	• Reading and analyzing technical diagrams, charts, and graphs • Writing technical emails and memos: Structure and language conventions • Listening exercises: Understanding technical instructions and following procedures • Grammar focus: Conditionals in technical communication
Week 5	• Writing technical reports: Organizing and presenting data and findings • Speaking practice: Participating in technical discussions and debates • Intercultural communication in technical contexts: Understanding and adapting to different cultural communication styles • Grammar review: Sentence structures for clear and concise technical writing
Week 6	• Developing critical thinking skills in technical communication: Evaluating arguments and evidence • Practice exercises on analyzing and critiquing technical information • Revision and practice of key technical vocabulary and terminology • Independent learning strategies: Resources for further development of technical English skills
Week 7	• Review and consolidation of key concepts and skills covered in the module • Final assessments, such as written assignments, presentations, or tests • Feedback and reflection on students' progress and areas for improvement • Discussion of future opportunities to apply technical English skills
Week 8	• Technical reading strategies: Skimming, scanning, and reading for specific purposes • Writing technical proposals: Structure, content, and persuasive language • Listening exercises: Understanding technical lectures or talks • Grammar focus: Complex sentence structures in technical writing
Week 9	• Developing effective technical documentation: Writing manuals, user guides, or instructions • Practice exercises on creating clear and user-friendly technical documents • Speaking practice: Simulating technical scenarios and role plays • Grammar review: Relative clauses and their usage in technical contexts
Week 10	• Enhancing technical presentation skills: Visual aids, delivery techniques, and engaging the audience • Practice exercises on delivering effective technical presentations • Listening activities: Understanding technical interviews or panel discussions • Vocabulary expansion: Industry-specific terms and expressions

Week 11	• Reviewing and refining technical writing skills: Editing and proofreading techniques • Writing technical research papers or case studies: Structure and academic language conventions • Intercultural communication challenges in international technical collaborations • Grammar focus: Cohesive devices for coherence in technical writing
Week 12	• Advanced reading comprehension: Analyzing and evaluating complex technical texts • Practice exercises on critical reading and synthesizing information • Speaking practice: Presenting and defending technical arguments or viewpoints • Grammar review: Modal verbs for expressing possibility and certainty
Week 13	• Specialized communication skills: Effective negotiation and persuasion in technical contexts • Practice exercises on negotiation scenarios and role plays
Week 14	• Review and reinforcement of key technical vocabulary and terminology • Independent study and project work
Week 15	Project presentations and discussions: Applying technical English skills in real-world contexts

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

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts		
Websites		

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

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	**Applied Mathematics I**	**Module Delivery**
Module Type	**Basic**	☒ **Theory**

Module Code	**E231**			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGx11 13	**Semester of Delivery**		3
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Dhia Chasib Ali		**e-mail**	Dhai.ali@uobasrah.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		**Semester**	1st Class
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of analytical solutions 2. To understand the different ways for solving engineering problems 3. Increasing the opportunity for students to practice thinking methods, such as reflective, deductive, and inductive thinking. 4. Increase pupils' skills needed to absorb what they are studying and to discover new relationships 5. To understand vector analysis and solution of ordinary differential equations .

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how deals with vectors 2. List the various types of governing system equations and trying to solve 3. Summarize what is meant by a matrix, vectors and ODE 4. Describe many types of equations and learn to solve 5. Full knowledge of basic concepts, facts and theories in mathematics. 6. Proving various mathematical problems. 7. The ability to employ mathematics in various life issues. 8. The ability to translate life issues into mathematical models.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Matrices** • Matrices – introduction – operations – determinants- inverse, Solution system of equation – Gauss and Cramer's methods – linear dependent [12 hrs] **Part B – Vectors** • Vectors- operations on vectors – dot & cross products, Applications on dot and cross products [12 hrs] • Lines & planes – relations between them- Distance between points and lines / planes • Vector valued functions – limit & continuity – Derivative and Integrals- Directional Derivatives- Tangent and normal vectors- Gradients – divergence- curl- conservative vector [24 hrs] • **Part C – Ordinary Differential equations** • Ordinary Differential Equations – Definitions – solutions - Separation of variables Homogeneous Equations – Exact and inexact equations [12 hrs] • Linear and Bernoulli Equations - Second order differential equations [12 hrs] • D- operator method foe homogenous and non-homogenous - Undetermined coefficients for non- homogenous equations - Variation of parameters for non- homogenous equations [18 hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	1	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2 hr	25% (25)	7	LO # 1-7
	Final Exam	2 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Matrices – introduction – operations – determinants- inverse
Week 2	Solution system of equation – Gauss and Cramer’s methods – linear dependent
Week 3	Vectors- operations on vectors – dot & cross products
Week 4	Applications on dot and cross products -
Week 5	Lines & planes – relations between them
Week 6	Distance between points and lines / planes

Week 7	Vector valued functions – limit & continuity – Derivative and Integrals- Directional Derivatives
Week 8	Tangent and normal vectors- Gradients – divergence- curl- conservative vector
Week 9	Ordinary Differential Equations – Definitions – solutions - Separation of variables
Week 10	Homogeneous Equations – Exact and inexact equations
Week 11	Linear and Bernoulli Equations
Week 12	Second order differential equations
Week 13	D- operator method foe homogenous and non-homogenous
Week 14	Undetermined coefficients for non- homogenous equations
Week 15	Variation of parameters for non- homogenous equations
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus By Ross L. Finney & George B. Thomas Calculus By B.G. Thomas	Yes yes
Recommended Texts	Calculus By Anton Bivens Davis	yes

Websites	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
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	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Physical Metallurgy**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE231**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGx11 14	**Semester of Delivery**		3
Administering Department		Materials	**College**	Engineering	
Module Leader	Nawal J. Hammadi		**e-mail**	nawalalmudeer@gmail.com	
Module Leader's Acad. Title		Assit. Professor	**Module Leader's Qualification**		Ph.D.

Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**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	**The objective of studying "Physical Metallurgy" is :1.To recognize the groups of metals in "Periodic Table" as "Transition metals", the atomic structure, elemental state and reactivity in earth crust – atmospheric gases. Chemical compounds of metals under the effect of acids , bases and salts and other aggressive agents, 2. Study of Metal Failures :a wide range of metal environment interaction leading to failure will be introduced. The course aimed to study the: 3. Mechanical properties relative to atomic structure and metallic bond i.e. Vander Waals forces. Moreover, the course include study of:4. "Physical and Mechanical Properties of Metals" such as ,yield and tensile strength, modulus of elasticity , hardness ,toughness acc. to B.S. & ASTM specifications, 5. The "Non-destructive tests" for the detection of surface defects as dye – penetrant and magnetic particles method & the "Destructive Tests for the detection of internal defects including X-rays, γ-rays and ultrasonic, Exercises. Also, this course also includes: 6.Study of the Crystalline Structure of Metals- Types of Crystalline Structural Defects-**

	7."Mechanical Deformation and Recovery"- Annealing and recrystallization - Superplasticity, Exercises. 8. Fracture of Metals -"Griffith's Crack Theory"- Factors leading to crack formation- Fatigue-Creep, 9.The industrial Shaping of Metals.10. An Introduction to steel- Microstructural Nature of Carbon Steels - Cooling Curves-Iron carbon system-Thermal Equilibrium Diagram-Phase change ,11. Mechanical Properties of carbon Steels and typical uses-Detection of Microstructural Changes of Carbon Steels. Factors Leading to Failure of Carbon Steels.12. Control and Corrective measures of Carbon Steels Failures. Case studies and Exercises.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Knowledge and Understanding of "Metals and Alloys Characteristics".** A1.An ability to apply knowledge of metals physical properties on science, and engineering practice. A2. An ability to design and conduct experimental testing, as well as to analyze and interpret the resultant data toward the corrective measures. A3. An ability to investigate then to identify, formulate, and solve engineering problems on the basis of theoretical or experimental data deduced from plant operation and maintenance . A4. An ability to use the techniques, skills, and modern engineering instruments and tools necessary for inspection and engineering practice. B. **Subject-specific skills** B1. The ability to design and select engineering materials properly for scientific and industrial applications. B2. The ability to think about solving problems related to the use of engineering materials and methods of control or avoiding them. B3. Writing scientific reports, reading blueprints and analyzing engineering materials. B4. The ability to keep pace with developments in engineering materials and their properties according to international standard.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following:** **<u>Part A – Fundamentals of Chemical , Physical and Mechanical Properties</u>** Atomic structure-Periodic table and transition metals-Metals reactivity- Metals interactions with acids ,alkalis, gases, aqueous solutions-Secondary bonding. The Physical and Mechanical Properties of Metals and alloys- Fundamentals-

	Tensile strength-Hardness- Impact- Exercises. [20hrs] - The crystalline structure of Metals - Normal structure versus defected structure- Examination Technique and Instrumentation -Identification of microstructural Defects-Mechanical Deformation and Recovery- Annealing and Recrystallization- Fracture of Metals-Ductile and Brittle Fracture-Exercises. [25hrs] **Part B - Phase Equilibrium of Steel** - An Introduction to Steel- Iron Production- The Manufacture of Steel- The Uses of Carbon Steel-The Microstructural Nature of Carbon Steel-The Formation of Alloys- The Solid -Solution -Eutectics and Eutectoids-Strengthening Mechanism in Alloys - Exercises. [15hrs] - Thermal Equilibrium Diagram- Case I (two metals only partially soluble in liquid state)- Case II (two metals mutually soluble in all proportions in liq. state becoming insoluble in solid state).Case III (two metals mutually soluble in all proportions in liq. state ,remain mutually soluble in all proportions in solid state – Case IV (two metals mutually soluble in all proportions in liq. State but only partially soluble in the solid state) Case V (a system of peritectic transformation) - Case VI (systems containing one or more intermediate phase) - Exercises. [20 hrs] - Heat Treatment of Carbon Steel I -Annealing-Normalizing. -Heat Treatment of Carbon Steel II- Hardening-Tempering- Isothermal transformation.(10 hrs)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects. 6- Scientific visits. 7- Seminars held in the department. 8- Summer training.

	Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Atomic structure-Periodic table and transition metals-Metals reactivity- Metals interactions with acids ,alkalis, gases, aqueous solutions-Secondary bonding.
Week 2	The Physical and Mechanical Properties of Metals and alloys- Fundamentals- Tensile strength-Hardness- Impact
Week 3	The crystalline structure of Metals - Normal structure versus defected structure- Examination Techniques and Instrumentation -
Week 4	The crystalline structure of Metals
Week 5	Normal structure versus defected structure- Examination Technique and Instrumentation

Week 6	dentification of microstructural Defects-Mechanical Deformation and Recovery- Annealing and Recrystallization- Fracture of Metals-Ductile and Brittle Fracture
Week 7	An Introduction to Steel- Iron Production- The Manufacture of Steel- The Uses of Steel.
Week 8	The Microstructural Nature of Carbon Steel-The Formation of Alloys- The Solid -Solution -Eutectics and Eutectoids-Strengthening Mechanism in Alloys .
Week 9	Thermal Equilibrium Diagram- Case I (two metals only partially soluble in liquid state)- Case II (two metals mutually soluble in all proportions in liq. state becoming insoluble in solid state) - graphical representation .
Week 10	Case III (two metals mutually soluble in all proportions in liq. state ,remain mutually soluble in all proportions in solid state - graphical representation
Week 11	Case IV (two metals mutually soluble in all proportions in liq. State but only partially soluble in the solid state) Case V (a system of peritectic transformation) graphical representation
Week 12	Case VI(systems containing one or more than intermediate phase)- graphical representation.
Week 13	Heat Treatment of Carbon Steel I -Annealing-Normalizing- graphical representation.
Week 14	Heat Treatment of Carbon Steel II-Hardening -Isothermal transformation- graphical representation.
Week 15	Heat Treatment of Carbon Steel II - Hardening ,Tempering - graphical representation.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Tensile Test.
Week 2	Hardness Test.
Week 3	Impact Test
Week 4	Microstructure for metals
Week 5	Heat Treatment by Isothermal Transformation.
Week 6	Annealing of Cold-Worked Carbon Steel.
Week 7	Annealing Versus Normalizing.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Metallurgy, Part I Applied physical Metallurgy, 6 ed. , R.A. Higgins,1999 Reprinted by Arnold (UK).	Yes
Recommended Texts	D.R. Askeland and P.P.Phule "The Science and Engineering of Materials, 4th ed. , Thomson Academic Center, USA,2003.	Yes
Websites	Libraries sites in some engineering and scientific universities.	

Grading Scheme

مخطط الدرجات

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

	D - Satisfactory	متوسط	60 – 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 – 59	Work meets minimum criteria.
Fail Group	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Chemical Metallurgy**		**Module Delivery**	
Module Type	**Basic learning activities (B)**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE232**			
ECTS Credits	**5**			
SWL (hr/sem)	**125**			
Module Level	15	**Semester of Delivery**	3	

Administering Department		Material	**College**	Engineering	
Module Leader	Hayder Abdulhasan Abbood		**e-mail**	Hayder.abood@uobasrah.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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	**The main objective of this course is to provide students with general basic knowledge about different aspects, problems and applications of chemical metallurgy and to provide them with an in-depth knowledge of thermodynamic metallurgy, kinetic of reactions and electrochemistry. The principles of electrorefining are introduced. The students can explain and apply the principles of interfacial forces between two and three phase and solutions. The students are familiar with the concepts of activity and activity coefficient. They can calculate complex equilibria; they can construct and interpret speciation and phase stability diagrams. The students can determine the conditions for removal of metals from solution by selective precipitation.**

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Knowledge and Understanding A1. Thermodynamic 1 and 2, Thermodynamic low Relations, Chemical Potential, Gibbs - Helmholtz Equation, Criteria of Equilibria A2. Explain about process flow sheet and reaction as well as chemical kinetics in detail A3. Study about different chemical kinetics and slag- metal reactions in detail. A4. Predict the chemical phenomena of interfacial forces between two and three phase A5. Understanding of the nature of polarized electrochemical reactions and an introduction of their application in corrosion behavior of metals Necessary for engineering practice. B. laws of diffusion. B1. Interpret Ellingham diagrams B2. Determination of Electrode potential. Thermodynamic aspects - Nerrnest equation. Galvanic series B3. Describe the chemical processes that take place during motels making. B4. The ability to keep pace with developments in engineering materials and their properties.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – T Thermochemistry and Kinetic chemistry

	- Rate Reaction, Rate-Controlling Step, Order of Reaction (First-order , Second-Order), Reversible reaction [15 hrs]. - Heterogeneous Reactions in metallurgical system), Rate Equation, Types of Reactions, Heat and Mass Transfer (Conduction, Convection and Radiation), Mass Transport in Heterogeneous Reactions, Diffusions (Diffusion in the solid state), Kirkendall Effect. [9 hrs] - Introduction to Electrochemistry or Electrometallurgy, Electrolytes (Classification of Electrolytes) and Electrodes, Conduction in electrolytes, Example of Electrolysis [13 hrs] Part B – Interfacial Phenomena - Introduction to Interfacial Phenomena, Surface energy, Surface tension, Interfacial energy of the other gas/liquid interface: three phase interfaces.. [10 hrs] - Adsorption, Adsorption Process, Adsorbent Material, Adsorption Isotherms, Langmuir , Adsorption Isotherm, Freundlich, Adsorption Potential. [8 hrs] - Nucleation, Classical nucleation theory, Homogeneous nucleation, Heterogeneous nucleation, The spinodal region nucleation, Experiments on the of crystals. [10 hrs] - Evaporation, Transpiration, Sublimation, Energy Balance Method, Aerodynamic method, Combined method.. [13 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories.

	5- Graduation projects. 6- Scientific visits. 7- Seminars held in the department. 8- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Thermodynamic, 1and 2 law
Week 2	Some thermodynamic relationship
Week 3	Introduction to Reaction kinetics, Homogeneous reaction
Week 4	Reversible reaction, Heterogeneous Reactions in metallurgical system), Rate Equation, Types of Reactions
Week 5	Heat and Mass Transfer (Conduction, Convection and Radiation), Mass Transport in Heterogeneous Reactions
Week 6	Diffusions (Diffusion in the solid state), Kirkendall Effect
Week 7	Introduction to Electrochemistry or Electrometallurgy, Electrolytes (Classification of Electrolytes) and Electrodes
Week 8	Conduction in electrolytes, Example of Electrolysis, Arrhenius Concept (Ionic Mobilities), Reduction and oxidation potentials: the standard potentials

Week 9	Cell Types, Cell Design Optimization, Cell Operation,
Week 10	The effects of polarization: decomposition voltage discharge potential, Electrowinning, Electrorefining
Week 11	Introduction to Interfacial Phenomena, Surface energy, Surface tension
Week 12	Adsorption, Adsorption Process, Adsorbent Material, Adsorption Isotherms, Langmuir, Adsorption Isotherm, Freundlich, Adsorption Potential
Week 13	Nucleation, Classical nucleation theory, Homogeneous nucleation, Heterogeneous nucleation, The spinodal region, Experiments on the nucleation of crystals.
Week 14	Evaporation, Transpiration, Sublimation, method.
Week 15	Energy Balance Method, Aerodynamic method, Combined

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Concentration of chemical materials
Week 2	Effect of temperature on density of liquids
Week 3	Effect of concentration of the reaction rate
Week 4	Determination of liquids Conductivity of
Week 5	Electroplating

Week 6	Determination of surface tension
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Chemical Metallurgy, by Chiranjib Kumar Gupta 2003	Yes
Recommended Texts	PHYSICAL CHEMISTRY, by ATKINS' 2008	No
Websites	Libraries sites in some scientific universities.	

Grading Scheme

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mechanics of Materials**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE233**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx11 16		**Semester of Delivery**	3	
Administering Department	MAE		**College**	ENGINEERING	
Module Leader	AZZAM DAWOOD HASSAN		**e-mail**	AZZAM.HASSAN@UOBASRAH.EDU.IQ	
Module Leader's Acad. Title	ASST. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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	**The objective of this materials is to provide the future engineer with the means of analyzing and designing various machines and load-bearing structures. Both the analysis and the design of a given structure involve the determination of stresses and deformations. The Deflections resulting and the stresses and strains set up within bodies , are all considered in** **an attempt to provide sufficient knowledge to enable any component to be designed such that it will not fail within its service.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course students will be able to: 1 Demonstrate an understanding of the concepts of stress and strain, and the stress-strain relationships for homogenous, isotropic materials. 2 Demonstrate an understanding of the relationships between loads, member forces and deformations and material stresses and strains in structural members under axial loading, torsion, flexural loadings, shear, and thin-walled pressure vessels. 3 Demonstrate an understanding of failure under complex stress states in structural members subjected to combined loadings. 4 Apply the above understanding to the designs and analysis of structural members based on strength and deformation criteria. 5 Demonstrate an understanding of the assumptions and limitations of the theories used in mechanics of materials. 6 Demonstrate competence in problem identification, formulation and solution, and critical thinking.
Indicative Contents المحتويات الإرشادية	Stress analysis Direct stress, direct strain, Hooke's Law, Young Modulus, double shear, factor of safety, temperature stresses. Compound bars. Shear force and bending moments diagrams Concentrated load only, Distributed load, combined loads, points of contraflexure,

	inclined load, distributed loads of increasing value. Slope And Deflection Direct integration method, Macaulay's method, Mohr's "area-moment" method, Principle of superposition, Energy method, Maxwell's theorem. Shear Stress Distribution Distribution of shear stress due to bending, Application to different sections, Vertical and horizontal shear, Limitation of shear stress distribution theory Bending, Simple bending theory Bending of composite, combined loading, Shear stresses owing to bending, Strain energy in bending, Built-in beam carrying different load conditions, Advantages and disadvantages of built-in beams.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects. 6- Scientific visits. 7- Seminars held in the department. 8- Summer training. Assessment methods 1- Short exams (Quiz).

	2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Types of Loads, Direct stress, Direct Strain, shear stress. Hooke's Law & Young's Modulus, Tensile Test
Week 2	Stress-Strain Diagram, Ductility, Poisson's ratio
Week 3	Shear strain, double shear stress , temperature stresses
Week 4	Types of beams, types of load, Beam carries Concentrated load, distributed load
Week 5	Beam carries Concentrated load, and distributed load
Week 6	Beam carries trinagle load or non-linear load. Beam carries combined load
Week 7	Bending of composite, combined loading, Shear stresses owing to bending,
Week 8	Built-in beam carrying different load conditions, Advantages and disadvantages of built-in beams
Week 9	Strain energy in bending,
Week 10	Direct integration method, Macaulay's method
Week 11	Mohr's "area-moment" method, Principle of superposition,

Week 12	Energy method, Maxwell's theorem
Week 13	Distribution of shear stress due to bending
Week 14	Application to different sections, Vertical and horizontal shear
Week 15	Limitation of shear stress distribution theory Laser source, Electrochemical removal.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	TENSILE TEST
Week 2	SHEAR FORCE AND BENDING MOMENT DIAGRAMS
Week 3	BENDING TEST
Week 4	TORSION TEST
Week 5	DEFLECTION
Week 6	DEFLECTION FOR CURVED BEAMS
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	MECHANICS OF MATERIALS 1, E. J. HEARN	Yes
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
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Thermodynamics and Fluid Mechanics**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE234**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGx11 17		**Semester of Delivery**	3	
Administering Department	MAE		**College**	ENGINEERING	
Module Leader			**e-mail**		
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	Understanding Thermodynamic Principles: Provide students with a thorough understanding of the fundamental principles and concepts of thermodynamics, including the laws of thermodynamics, properties of substances, energy transfer, and thermodynamic processes. Application of Thermodynamic Laws: Enable students to apply the laws of thermodynamics to analyze and solve problems related to energy conversion, heat transfer, and work interactions in various engineering systems. Analysis of Thermodynamic Cycles: Familiarize students with different thermodynamic cycles, such as the Carnot cycle, Rankine cycle, and refrigeration cycles. The aim is to develop their ability to analyze and optimize the performance of thermal systems. Fluid Properties and Behavior: Introduce students to the properties and behavior of fluids, including fluid statics, fluid flow, fluid dynamics, viscosity, and fluid pressure. The aim is to provide a foundation for understanding fluid mechanics. Fluid Flow Analysis: Develop students' skills in analyzing fluid flow phenomena, such as laminar and turbulent flow, flow rate, pressure distribution, and flow measurement techniques. The aim is to enable them to analyze and design fluid systems and components. Conservation Laws in Fluid Mechanics: Teach students the conservation laws, including mass, momentum, and energy conservation, and their application in solving fluid flow problems. The aim is to develop their ability to analyze fluid flow behavior and predict system performance. Fluid Forces and Applications: Explore fluid forces, such as buoyancy, drag, and lift, and their applications in various engineering fields, including aerodynamics, hydrodynamics, and HVAC systems. The aim is to provide students with practical knowledge and applications of fluid mechanics. Thermodynamics and Fluids in Engineering Systems: Integrate thermodynamic and fluid mechanics principles to analyze and design engineering systems, such as power plants, heat exchangers, turbines, pumps, and compressors. The aim is to enable students to understand and optimize the performance of these systems. Problem-Solving and Analytical Skills: Develop students' problem-solving and

	analytical skills through the application of thermodynamics and fluid mechanics principles to real-world engineering problems. The aim is to enhance their ability to analyze, evaluate, and propose solutions to complex engineering challenges.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge of Thermodynamic Principles: Develop a deep understanding of the fundamental principles and laws of thermodynamics, including the laws of thermodynamics, thermodynamic properties, energy transfer, and thermodynamic equilibrium Understanding of Fluid Mechanics Concepts: Acquire a comprehensive understanding of fluid properties, fluid statics, fluid dynamics, fluid flow behavior, viscosity, and fluid pressure. Application of Thermodynamics: Apply thermodynamic principles to analyze and solve problems related to energy conversion, heat transfer, and work interactions in various engineering systems. Analysis of Thermodynamic Cycles: Analyze and evaluate the performance of different thermodynamic cycles, such as the Carnot cycle, Rankine cycle, and refrigeration cycles, and understand the impact of cycle parameters on system efficiency. Fluid Flow Analysis: Analyze and calculate fluid flow phenomena, including laminar and turbulent flow, flow rate, pressure distribution, and flow measurement techniques. Understand the factors influencing fluid flow behavior. Application of Conservation Laws: Apply the principles of conservation of mass, momentum, and energy to analyze and predict fluid flow behavior, pressure drop, and fluid forces in engineering systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 5- Introduction to Reaction kinetics, Homogeneous reaction, Rate Reaction, Rate-Controlling Step, Order of Reaction (First-order , Second-Order), Reversible reaction, Heterogeneous Reactions in metallurgical system), Rate Equation, Types of Reactions, Heat and Mass Transfer (Conduction, Convection and Radiation), Mass Transport in Heterogeneous Reactions, Diffusions (Diffusion in the solid state), Kirkendall Effect 6- Introduction to Electrochemistry or Electrometallurgy, Electrolytes (Classification of Electrolytes) and Electrodes, Conduction in electrolytes, Example of Electrolysis, Arrhenius Concept (Ionic Mobilities), Reduction and oxidation potentials: the standard potentials, Cell Types, Cell Design Optimization, Cell Operation , The effects of polarization :decomposition voltage discharge potential, Electrowinning , Electrorefining. 7- Introduction to Interfacial Phenomena, Surface energy, Surface tension,

	Interfacial energy of the other gas/liquid interface:the three phase interface. 8- Adsorabtion, Adsorption Process, Adsorbent Material, Adsorption Isotherms, Langmuir , Adsorption Isotherm, Freundlich, Adsorption Potential. 9- Nucleation, Classical nucleation theory, Homogeneous nucleation, Heterogeneous nucleation, The spinodal region, Experiments on the nucleation of crystals. 10- Evaporation, Transpiration, Sublimation, Energy Balance Method, Aerodynamic 11- Pressure and velocity distributions 12- Pascal law, pressure head, manometers, piezometer, differential Manometer, inverted manometer, barometer, Bourdon Gauge, forces on immersed curved surfaces, equilibrium of flotation surfaces, pressure distribution, 13- Flow of Fluids 14- gas and liquid, ideal gas, gas mixture, enthalpy and entropy, phase transformation, constant temp. process, constant pressure process, isochoric process, adiabatic process, isotropic process, polytrophic process, control volume, Bernoulli equation, momentum and flow rate, Euler equation. 15- Non-dimensional Analysis 16- Flow in pipes, dimensional Analysis, laminar and turbulent flow, Rynold's number, boundary layers, pressure drop, friction losses, velocity distributions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Reading and self-learning. • Training and activities during lecture. • HomeWorks. • Suggesting some websites for extra reading. • Discussions and workshops.

Student Workload (SWL)

الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1.5 hr	20% (10)	7	LO # 1-7
	Final Exam	2hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction and Basic Concepts

	Thermodynamics and Energy, Systems and Control Volumes, State and Equilibrium,
Week 2	Processes and Cycles, The Steady-Flow Process,
Week 3	Zeroth Law of Thermodynamics, Variation of Pressure with Depth, Thermodynamics, Energy Balance, Energy Change of a System, ΔE system,
Week 4	Pressure Measurement Devices Energy Conversion and General Energy Analysis Forms of Energy,
Week 5	Types of Energy, Mechanical Forms of Work, The First Law of Phases of a Pure Substance
Week 6	Phase-Change Processes of Pure Substances, Saturated Liquid and Vapor, Property Diagrams,
Week 7	The T-s Diagram, The P-v Diagram, Enthalpy, Mixture, The Ideal-Gas Equation of State.
Week 8	Energy Analysis of Closed Systems Polytropic Process, Energy Balance for Closed Systems,
Week 9	Specific Heat Relations of Ideal Gases, Internal Energy,
Week 10	Enthalpy, and Specific Heat, The Second Law of Thermodynamics
Week 11	Thermal Energy Reservoirs, Heat Engines, Thermal Efficiency, The Second Law of Thermodynamics: Kelvin–Planck Statement, Refrigerators and Heat Pumps, Heat Pumps, Cycles.
Week 12	Entropy Entropy, Internally Reversible Processes, Entropy Change, The Entropy Change of Ideal Gases, Multistage Compression with Intercooling.
Week 13	Pressure and velocity distributions Pascal law, pressure head, manometers, piezometer, differential Manometer, inverted manometer, barometer, Bourdon Gauge, forces on immersed curved surfaces, equilibrium of flotation surfaces, pressure distribution,

Week 14	Flow of Fluids gas and liquid, ideal gas, gas mixture, enthalpy and entropy, phase transformation, constant temp. process, constant pressure process, isochoric process, adiabatic process, isotropic process, polytrophic process, control volume, Bernoulli equation, momentum and flow rate, Euler equation.
Week 15	Non-dimensional Analysis Flow in pipes, dimensional Analysis, laminar and turbulent flow, Rynold's number, boundary layers, pressure drop, friction losses, velocity distributions.

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	Fluid and Thermodynamics Volume 1: Basic Fluid Mechanics	no
Recommended Texts	Thermodynamics	Yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Applied Mathematics II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E221**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	19		**Semester of Delivery**	4	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Dhia Chasib Ali		**e-mail**	Dhai.ali@uobasrah.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	Applied Math-I	**Semester**	1st
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of analytical solutions 2. To understand the different ways for solving engineering problems 3. Increasing the opportunity for students to practice thinking methods, such as reflective, deductive, and inductive thinking. 4. Increase pupils' skills needed to absorb what they are studying and to discover new relationships 5. To understand Laplace transform, series analysis and solution of ordinary differential equations .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how deals with Laplace transform, series and triple integrals 2. List the various types of governing system equations and trying to solve 3. Summarize what is meant by Laplace transform, series and integrals 4. Describe many types of equations, series and learn to solve 5. Full knowledge of basic concepts, facts and theories in mathematics. 6. Proving various mathematical problems. 7. The ability to employ mathematics in various life issues. 8. The ability to translate life issues into mathematical models.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Laplace transform</u> Laplace transform , gamma function and inverse Laplace transform [5 hrs] Theories 1 and 2 (5 hrs) Theories 3 and 4 (5 hrs) Theories 5 and 6 (5 hrs) Solution of ODE (5 hrs) Unit step functions (5 hrs) <u>Part B – Series</u> Sequences – Arithmetic and Engineering series (10 hrs) Convergence tests-alternating and power series, Taylor and Maclaurin (15 hrs) <u>Part C– double & Triple Integrals</u> Double integrals, Area of plane regions, volume, surface area, physical applications, volume and area in polar coordinate (15 hrs)

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	1	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2 hr	25% (25)	7	LO # 1-7
	Final Exam	2 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Laplace Transform for Functions – Gamma Function
Week 2	Inverse Laplace Transform
Week 3	Theory no. 1 and 2
Week 4	Theory no. 3 and 4
Week 5	Theory no. 5 and 6
Week 6	Solution of ODE by Laplace Transform
Week 7	Unit step functions
Week 8	Sequences - converge and diverge – finding nth term
Week 9	Series – Arithmetic series and geometric series
Week 10	Convergence tests
Week 11	Alternating series and power series
Week 12	Taylor series and Maclaurin series
Week 13	Double integral and volume- Area of plane region-
Week 14	Volume, area and surface Area in polar coordinate
Week 15	Physical Applications, Centroid and moment of inertia
Week 16	**Preparatory week before the final Exam**

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

Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus By Ross L. Finney & George B. Thomas Calculus By B.G. Thomas	Yes yes
Recommended Texts	Calculus By Anton Bivens Davis	yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Materials Technology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE241**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGx11 20		**Semester of Delivery**	4	
Administering Department	Materials		**College**	Engineering	
Module Leader	Ahmad K. Jassim		**e-mail**	ahmadkj1966@yahoo.com	
Module Leader's Acad. Title	Guest Lecture		**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	1/06/2023		**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	This course aims to teach the student how to select materials engineering for design and use as well as the main motivation of selection and selection process with some case study and applied CES Edu Pack software tutorial.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Ability to apply engineering and management principles, and knowledge of economic decision-making to manage projects. 2- Understanding of the impact of materials engineering solutions on the environment, and knowledge of materials and devices for sustainable development. 3- An ability to identify, formulate, and solve engineering problems. 4- Understanding of the impact of engineering solutions on society and the responsibilities of the discipline. 5- The ability to design and select engineering materials for scientific and industrial applications. 6- The ability to think about solving problems related to the use of engineering materials and methods of avoiding them. 7- Writing scientific reports, reading blueprints and analyzing engineering materials.

	8- The ability to keep pace with developments in engineering materials and
Indicative Contents المحتويات الإرشادية	1. Introduction of Engineering Materials Technology 2. Furnaces 3. Refractory Materials 4. Casting Technology 5. Forming Technology 6. Coating Technology 7. Welding technology 8. Brazing 9. soldering 10. Cutting technology

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 5- present group Project in the class.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction of Engineering Materials Technology [7 hrs].
Week 2	Furnaces [7 hrs].
Week 3	Furnaces [7 hrs].
Week 4	Refractory Materials [7 hrs].
Week 5	Casting Technology [7 hrs].
Week 6	Casting Technology [7 hrs].

Week 7	Forming Technology [7 hrs].
Week 8	Forming Technology [7 hrs].
Week 9	Coating Technology [7 hrs].
Week 10	Coating Technology [7 hrs].
Week 11	Welding Technology [7 hrs].
Week 12	Welding Technology [7 hrs].
Week 13	Brazing and Soldering [7 hrs].
Week 14	Cutting Technology [7 hrs].
Week 15	Cutting technology [7 hrs].
Week 16	Presentation by student [7 hrs].

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Casting Workshop
Week 2	Forming workshop
Week 3	Welding workshop
Week 4	Welding Technology
Week 5	Welding workshop
Week 6	Cutting workshop
Week 7	Cutting workshop

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Materials Technology, Third Edition, W. Bolton	Yes
Recommended Texts	1. Manufacturing processing and system, Phillip F. Ostwald and Jairo Munoz, ninth edition 2. Introduction to basic manufacturing processes and workshop technology, Rajender Sing, New Age International Publishers	yes
Websites		

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Metallurgy**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE242**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGx11 21	**Semester of Delivery**		4
Administering Department		Materials	**College**	Engineering	
Module Leader	Nawal J. Hammadi		**e-mail**	nawalalmudeer@gmail.com	
Module Leader's Acad. Title		Assit. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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	**The objective of studying "Engineering Metallurgy" of (Ferrous and Non-Ferrous metals) is to recognize: 1.The** Metallurgical Process Technology - Development of Iron & steel -Pig iron, **2.**The manufacture of steel -The solidification process- Removal of deleterious elements such as sulfur - Temperature control - Carbon content control, **3.**Precise addition of alloying elements,**4.**The microstructural nature of carbon steel,**5.**The"Hypo-eutectoid","Eutectoid",and"Hyper-euotectoid"Steels. **6.**Construction of Equilibrium Phase Diagram 0-6.67% C,**7.**The multi-phase change as (α,β,γ,p & cm),**8.**Relationship of carbon content to mechanical properties, microstructure and mechanical properties, **9.**Application and uses of carbon steel,**10.**Formation of alloy steel,**11.**Intermetallic compounds, **12.**Eutectics and eutectoids **13.**Hardening Processes,14.Eutectic and peritectic transformation.**15.**Cast iron and its modified types, **16.**Alloy steels, 17.Additives **18.Copper & its alloys, 19. Aluminum & its alloys, 20.**Surface Hardening **21**.Welding
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Knowledge and Understanding of "Engineering Metallurgy".** A1.An ability to apply knowledge of metals phase equilibria on science, and engineering practice. A2. An ability to design and conduct experimental testing, as well as to analyze and interpret the resultant data toward the corrective measures. A3. An ability to investigate then to identify, formulate, and solve engineering problems on the basis of theoretical or experimental data deduced from plant operation and maintenance . A4. An ability to use the techniques, skills, and modern engineering instruments and tools necessary for inspection and engineering practice.

	B. **Subject-specific skills** B1. The ability to design and select engineering materials properly for scientific and industrial applications. B2. The ability to think about solving problems related to the use of engineering materials and methods of control to avoid metal/ alloy failure. B3. Writing scientific reports, reading blueprints and analyzing engineering materials. B4. The ability to keep pace with developments in engineering materials and their properties according to international standards.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Part A – Solidification and Iron- carbon system Solidification of Metals and Alloys, Crystal Growth from the Liquid Phase, The Heat of Fusion and Vaporization, The Nature of the Liquid-Solid Interface Dendritic Growth in Pure Metals, Freezing in Alloys with Planar Interface, dendritic, freezing in alloys, Freezing of Ingots, The Grain Size of Castings, Segregation, Homogenization, Porosity. The Iron-Carbon Equilibrium Phase Diagram Carbon Steel , Phase diagram of steel, The eutectoid transformation of Austenite, The Growth of Pearlite, The Effect of Temperature on the Pearlite Transformation The Effects of Alloying Elements on the Growth of Pearlite, The Rate of Nucleation of Pearlite Time-Temperature-Transformation Curves, The Martensite Transformation in Steel Hardenability, The Variables that Determine the Hardenability of a Steel Tempering of Quenched steel Part B – Alloy steel and nonferrous alloys Tempering of Quenched steel Alloy Steel, The effect of alloying elements on the steel Low Alloy Steel, High Alloy Steel Cast Iron Copper and its Alloys Aluminum and its Alloys Titanium and its Alloys Superalloys
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects. 6- Scientific visits. 7- Seminars held in the department. 8- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

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	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Solidification of Metals and Alloys, Crystal Growth from the Liquid Phase, The Heat of Fusion and Vaporization, The Nature of the Liquid-Solid Interface
Week 2	Dendritic Growth in Pure Metals, Freezing in Alloys with Planar Interface, dendritic, freezing in alloys, Freezing of Ingots,
Week 3	The Grain Size of Castings, Segregation, Homogenization, Porosity.
Week 4	The Iron-Carbon Equilibrium Phase Diagram Carbon Steel , Phase diagram of steel,
Week 5	The eutectoid transformation of Austenite
Week 6	The Growth of Pearlite, The Effect of Temperature on the Pearlite Transformation
Week 7	The Effects of Alloying Elements on the Growth of Pearlite
Week 8	The Rate of Nucleation of Pearlite
Week 9	Time-Temperature-Transformation Curves, The Martensite Transformation in Steel Hardenability,
Week 10	The Variables that Determine the Hardenability of a Steel Tempering of Quenched steel
Week 11	Alloy Steel, The effect of alloying elements on the steel
Week 12	Low Alloy Steel, High Alloy Steel

Week 13	Cast Iron Copper and its Alloys
Week 14	Aluminum and its Alloys
Week 15	Titanium and its Alloys Superalloys

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	1.Safety Regulations in the Lab. Work including: Electrical, Mechanical and Chemical Safety Regulations, 2.Recognition of metals and alloys, tools & Instruments available.
Week 2	Microstructural examination of carbon steels of different grades.
Week 3	Microstructural examination of cast iron of different grades(i.e.carbon content).
Week 4	Microstructural examination of different types of copper alloys (brass, bronze,cuppro-nickel) compared to Al-alloys.
Week 5	Microstructural examination of quenched pearlitic steel(i.e.the martensite &bainite)
Week 6	Microstructural examination of carbon steels of annealing.
Week 7	Microstructural examination of carbon steels after normalizing.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Metallurgy, Part I Applied physical Metallurgy, 6 ed. , R.A. Higgins,1999 Reprinted by Arnold (UK).	Yes
Recommended Texts	D.R. Askeland and P.P.Phule "The Science and Engineering of Materials, 4th ed. , Thomson Academic Center, USA,2003.	Yes
Websites	Libraries sites in some engineering and scientific universities.	

Grading Scheme

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Strength of Materials**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE243**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGx11 22	**Semester of Delivery**		4
Administering Department		MAE	**College**	ENGINEERING	
Module Leader	AZZAM DAWOOD HASSAN		**e-mail**	AZZAM.HASSAN@UOBASRAH.EDU.IQ	
Module Leader's Acad. Title		ASST. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	

Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**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	**The objective of this materials is to provide the future engineer with the means of analyzing and designing various machines and load-bearing structures. Both the analysis and the design of a given structure involve the determination of stresses and deformations. The Deflections resulting and the stresses and strains set up within bodies , are all considered in** **an attempt to provide sufficient knowledge to enable any component to be designed such that it will not fail within its service.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Knowledge and Understanding A1. An ability to apply knowledge of mathematics, science, and engineering. A2. An ability to design and conduct experiments, as well as to analyze and interpret data. A3. An ability to identify, formulate, and solve engineering

	problems. A4. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. B. Subject-specific skills B1. The ability to design and select engineering materials for scientific and industrial applications. B2. The ability to think about solving problems related to the use of engineering materials and methods of avoiding them. B3. Writing scientific reports, reading blueprints and analyzing engineering materials. B4. The ability to keep pace with developments in engineering materials and their properties.
Indicative Contents المحتويات الإرشادية	The course include: Torsion Torsion theory, Polar second moment of area, Shear stress and shear strain in shafts, , Torsional rigidity, hollow shafts, thin-walled tubes, Composite shafts connections , Strain energy in torsion, Power transmitted by shafts, Combined stress systems. Thin Cylinders and Shells Internal pressure, stresses, Thin rotating ring and spherical shell, pressure Vessels, Cylindrical vessel with hemispherical end, Effects of end plates and joints. Thick cylinders Longitudinal stress, Maximum shear stress, Compound cylinders, Shrinkage or interference allowance, Compound cylinder -different materials, Thick cylinder - internal pressure only, Comparison with thin cylinder theory Complex Stresses Stresses on oblique planes, Material subjected to pure shear, two mutually perpendicular direct stresses, combined stresses, Graphical solution - Mohr 's stress circle, Three-dimensional stresses -graphical representation

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects. 6- Scientific visits. 7- Seminars held in the department. 8- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL)

الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Torsion theory, Polar second moment of area, Torsional Strain energy in torsion,

Week 2	Shear stress and shear strain in shafts,
Week 3	rigidity, hollow shafts, thin-walled tubes,
Week 4	Power transmitted by shafts, Combined stress systems.
Week 5	Internal pressure, stresses,
Week 6	Thin rotating ring and spherical shell, pressure Vessels
Week 7	Cylindrical vessel with hemispherical end
Week 8	Effects of end plates and joints.
Week 9	Longitudinal stress, Maximum shear stress,
Week 10	Compound cylinders,
Week 11	Shrinkage or interference allowance, Compound cylinder -different materials,
Week 12	Thick cylinder - internal pressure only, Comparison with thin cylinder theory
Week 13	Stresses on oblique planes, Material subjected to pure shear,
Week 14	two mutually perpendicular direct stresses, combined stresses,
Week 15	Graphical solution - Mohr 's stress circle, Three-dimensional stresses -graphical representation

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Curve beam TEST
Week 2	Thin cylinder test
Week 3	Thick cylinder TEST

Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	MECHANICS OF MATERIALS 1, E. J. HEARN	Yes
Recommended Texts		
Websites		

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

Fail Group **(0 – 49)**	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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	**Basics of Matlab**			**Module Delivery**	
Module Type	**Basic learning activities**			☐ **Theory**	
Module Code	**MAE244**			☐ **Lecture**	
ECTS Credits	**4**			☐ **Lab**	
SWL (hr/sem)	**100**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 23		**Semester of Delivery**	4	
Administering Department	MAE		**College**	Engeneering	
Module Leader	Esraa Habeeb Kadhim		**e-mail**	esraa.kadham@uobasrah.edu.iq	
Module Leader's Acad. Title	Leacturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval	01/06/2023		**Version Number**	1.0	

Date			

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	MATLAB is a programming platform designed specifically for engineers and scientists to analyze and design systems and products that transform our world. The heart of MATLAB is the MATLAB language, a matrix-based language allowing the most natural expression of computational mathematics for which MATLAB is a proprietary multi-paradigm programming language and numeric computing environment developed by MathWorks. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Introduction and Basic Festures , Starting Matlab 2. Creating MATLAB expressions. 3. Hierarchy of arithmetic operations ,Entering multiple statements per line, Output display format. 4. Mathematical functions 5. Basic Plotting, Introduction , Specifying line styles and colors , Multiple data sets in one plot, Plotting multiple plots seprately, Create graph with two y-axes 6. Loops and Controlling Command 7. Matrix, Entering a vector, Entering a matrix 8. Matrix indexing , Colon operator, Linear spacing Colon operator in a matrix. Creating a sub-matrix, Deleting row or column, Dimension, Continuation. Transposing a matrix, Concatenating matrices 9. Array operations , Reshaping arrays. Rotating matrices and arrays, Solving

	linear equations , Differentiating and integrating symbolic expressions 10. Programming in MATLAB (M-File), M-File Scripts, M-File functions, . Input and output arguments, Input and output to a script file, Input and output to a function file, Output commands
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. –MATLAB :- Introduction and Basic Festures , Starting Matlab , Creating MATLAB expressions, Hierarchy of arithmetic operations ,Entering multiple statements per line, Output display format. Mathematical functions Basic Plotting, Introduction , Specifying line styles and colors , Multiple data sets in one plot, Plotting multiple plots seprately, Create graph with two y-axes Loops and Controlling Command , Matrix, Entering a vector, Entering a matrix Matrix indexing , Colon operator, Linear spacing Colon operator in a matrix. Creating a sub-matrix, Deleting row or column, Dimension, Continuation. Transposing a matrix, Concatenating matrices Array operations , Reshaping arrays. Rotating matrices and arrays, Solving linear equations , Differentiating and integrating symbolic expression Programming in MATLAB (M-File), M-File Scripts, M-File functions, . Input and output arguments, Input and output to a script file, Input and output to a function file, Output commands

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Self-learning through homework and mini-projects within the lectures. 3- Laboratories. 5- Graduation projects. - Scientific visits.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and Basic Festures , Starting Matlab , Creating MATLAB expressions.
Week 2	Hierarchy of arithmetic operations ,Entering multiple statements per line, Output display format
Week 3	Mathematical functions
Week 4	Basic Plotting, Introduction , Specifying line styles and colors , Multiple data sets in one plot, Plotting multiple plots separately, Create graph with two y-axes
Week 5	Array operations , Reshaping arrays. Rotating matrices and arrays, Solving linear equations , Differentiating and integrating symbolic expressions
Week 6	Programming in MATLAB (M-File), M-File Scripts, M-File functions, . Input and output arguments, Input and output to a script file, Input and output to a function file, Output commands
Week 7	Mid-term Exam+ Debugging M-File
Week 8	GUI (Graphical User Interface)
Week 9	Programming the GUI , Saving and running a GUI
Week 10	String Statement, Library Functions
Week 11	Cell Arrays
Week 12	System Identification Simulation
Week 13	SWITCH-CASE , IF-ELSE-END
Week 14	Insert System Object Code Using MATLAB Editor .

Week 15	Anonymous Functions .
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction in MATLAB
Week 2	Lab 2: Entering multiple statements per line & Mathematical Function
Week 3	Lab 3: Basic Plotting, Multiple data sets in one plot, Plotting multiple plots separately, Create graph with two y-axes.
Week 4	Lab 4: Array operations , Reshaping arrays. Rotating matrices and arrays, Solving linear equations , Differentiating and integrating symbolic expressions
Week 5	Lab 5: Programming in MATLAB (M-File),
Week 6	Lab 6: Debugging M-File
Week 7	Lab 7: GUI (Graphical User Interface) & System Identification Simulation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	MATLAB Help Version 6.5	Yes
Recommended Texts	الدليل المرجعي والتعليمي، المهندس عبد الكريم البيكو، (دار شعاع للنشر) MATLAB 6.5 www.mathworks.com	Yes

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Basics of Matlab**		**Module Delivery**	
Module Type	**Basic learning activities**		√ **Theory** √ **Lecture** √ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE245**			
ECTS Credits	**4**			
SWL (hr/sem)	**100**			
Module Level	UGx11	**Semester of Delivery**		4

Administering Department	MAE	**College**	Engeneering
Module Leader	Esraa Habeeb Kadhim	**e-mail**	esraa.kadham@uobasrah.edu.iq
Module Leader's Acad. Title	Leacturer	**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	Learn AutoCAD software fundamentals Problem solving Effective communication Critical thinking Graphical Communications with manufacturing and construction personnel using graphical representations of physical objects.
Module Learning Outcomes	Utilize the power and precision of AutoCAD as a drafting and design tool used in the mechanical design and manufacturing industries. Apply basic CAD concepts to develop and construct accurate 2D geometry through creation of basic geometric constructions.

مخرجات التعلم للمادة الدراسية	Create, manipulate and edit 2D , 3D drawings and figures. Apply elements of mechanical drafting such as layers, dimensions, drawing formats, and 2D , 3D figures in projects.
Indicative Contents المحتويات الإرشادية	Provide lectures using AutoCAD software, demonstrating commands via user interface and typed commands. Use examples and projects seen in the CAD and drafting industry. Demonstrate AutoCAD commands and workflow through lecture and videos. Show industry standard procedures to solve various drafting and CAD related industry problems. Oversee open lab time to assist students in assigned projects. Use questions and reinforce lecture material for guiding students to complete projects.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Self-learning through homework and mini-projects within the lectures. 3- Laboratories. 5- Graduation projects. - Scientific visits.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	38	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction Starting AUTOCAD , Creating AUTOCAD expressions.
Week 2	GETTING STARTED WITH AUTOCAD
Week 3	GETTING STARTED WITH AUTOCAD
Week 4	Drawing Lines in AutoCAD, Coordinate Systems, Object Selection Methods.2-DIMENSIONS
Week 5	Drawing Lines in AutoCAD, Coordinate Systems, Object Selection Methods.2-DIMENSIONS

Week 6	Drawing Lines in AutoCAD, Coordinate Systems, Object Selection Methods.3-DIMENSIONS
Week 7	STARTING WITH ADVANCED SKETCHING
Week 8	Drawing Arcs, Drawing Rectangles, ,
Week 9	Drawing Ellipses, Drawing Regular Polygon
Week 10	Drawing Poly lines
Week 11	Placing Points, Drawing Infinite Lines, Writing a Single Line Text
Week 12	BASIC DIMENSIONING, GEOMETRIC DIMENSIONING, AND TOLERANCING
Week 13	MODEL SPACE VIEWPORTS
Week 14	PAPER SPACE VIEWPORTS
Week 15	LAYOUTS PLOTTING DRAWINGS
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction in AUTOCAD
Week 2	Lab 2: Entering multiple statements per line & Mathematical Function
Week 3	Lab 3: Basic Plotting, Multiple data sets in one plot, Plotting multiple plots separately, Create graph with two DIMENSIONS.
Week 4	Lab 4: Drawing Arcs, Drawing Rectangles, Drawing Ellipses, Drawing Regular Polygon
Week 5	Lab 5: Drawing Polylines, Placing Points, Drawing Infinite Lines, Writing a Single Line Text
Week 6	Lab 6:BASIC DIMENSIONING, GEOMETRIC DIMENSIONING, AND TOLERANCING
Week 7	Lab 7: ODEL SPACE VIEWPORTS, PAPER SPACE VIEWPORTS, AND LAYOUTS PLOTTING DRAWINGS

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	AutoCAD 2022 Instructor: A Student Guide for In-Depth Coverage of AutoCAD's Commands and Features James Leach, Shawna Lockhart	
Recommended Texts		

Grading Scheme

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E351**				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level	25		**Semester of Delivery**	5	
Administering Department	MAE		**College**	ENGINEERING	
Module Leader	Imad Obaid Al-Fahad		**e-mail**	emad.bajee@uobasrah.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	1. Preparing and qualifying engineers to meet the requirements of the labor market in the private and public sectors in materials engineering. 2. Providing distinguished academic programs in the field of materials engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Developing and improving scientific research in the fields of materials engineering, writing programs for solving differential equations and complex functions, data processing, digital signal analysis and control. 4. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills. 5. Building and developing partnerships with the governmental and private sectors and the community with all its various institutions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A. Knowledge and Understanding** A1- Clarify the basic concepts of Engineering Analysis and their applications in social and industrial fields. A2- Acquiring the skill in dealing with and addressing problems through the acquired sciences in this field. A3- Acquisition of basic skills to solve engineering problems. A4- Gaining experience in describing engineering problems mathematically and finding related equations to solve them. **B. Subject-specific skills** B1 - The ability to solve mathematical equations. B 2 - The ability to think about addressing problems according to the algorithms and methods of their work. B 3 - Writing scientific reports, reading charts, and analyzing digital data.
Indicative Contents المحتويات الإرشادية	**Complex variables (50 hrs.)** Complex number and variable operations, derivative and analytic functions, Cauchy Riemann equation, geometry of analytic function. Complex integration Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula, derivatives of analytic functions.

	Fourier series (40 hrs.) Periodic functions, Fourier series, even and odd functions, half range expansion, complex Fourier series, Fourier integral, Fourier cosine and sine transforms, Fourier transform. **Laplace Transform of Special Functions and Cases (20 hrs.)** Laplace Transform of Special Functions such as unit step, periodic function and Cases Inverse Laplace Transform **Partial Differential Equations (40 hrs.)** Basic concept, modeling vibrating string, wave equation, heat equation, separation of variables, D 'Alembert solution of the wave equation, modeling of membrane 2D wave equation, rectangular membrane , Laplacian in polar coordinate, solution by Laplace transform.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Teaching and Learning Methods** 1. Explanation and clarification through lectures. 2. Using data show, smart boards, and plasma screens. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars held in the department. 8. Mid-term and summer training. **Assessment methods** 1. Short exams (quizzes). 2. Homework. 3. Semester and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interaction within the lecture.

	6. Reports

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Complex Functions
Week 2	Special Complex Functions
Week 3	Continuity and Differentiation
Week 4	Cauchy-Riemann Equations
Week 5	Complex Integration
Week 6	Fourier Series
Week 7	Complex Fourier Series
Week 8	Laplace Transform of Special Functions and Cases
Week 9	Inverse Laplace Transform
Week 10	Ordinary Differential Equations
Week 11	Solution of ODE
Week 12	Partial Differential Equation
Week 13	Using Separation of Variables to Solve PDE (Solution of 1-Dim wave equation)
Week 14	Solution of 1-Dim Diffuse Equation
Week 15	Solution of 2-Dim Laplace Equation

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1.Advanced Engineering Mathematics, Wylie, McGraw Hill Books Company. 2.Advanced Engineering Mathematics, Kreyszig, Jon Wylie and Sons. 3.Mathematical Methods for Engineers and Scientists, K. T. Tang	Yes
Recommended Texts		
Websites		

Grading Scheme

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

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	Behavior of Engineering Materials I	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE351**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	31	**Semester of Delivery**	6

Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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	I. Understanding Failure Mechanisms: The module aims to provide students with a comprehensive understanding of the different failure mechanisms that can occur in engineering materials, such as fracture, fatigue, creep, corrosion, and wear. Students will learn about the causes, modes, and characteristics of these failures. II. Failure Analysis Techniques: The module aims to introduce students to various failure analysis techniques used to investigate and determine the root causes of material failures. Students will learn about experimental and analytical methods, including microscopy, spectroscopy, mechanical testing, and non-destructive testing, to analyze failed components and identify failure modes. III. Fracture Mechanics: The module aims to provide students with a deep understanding of fracture mechanics principles and their application in

	predicting the behavior of cracked materials. Students will learn about stress analysis, crack propagation, fracture toughness, and the importance of designing against brittle fracture. IV. Fatigue and Creep: The module aims to educate students about the phenomena of fatigue and creep, which are time-dependent failures. Students will learn about the factors influencing fatigue and creep, fatigue life estimation methods, and strategies to prevent fatigue and creep failures in engineering materials. V. Corrosion and Wear: The module aims to introduce students to corrosion and wear mechanisms, which can lead to material degradation and failure. Students will learn about different types of corrosion and wear, factors affecting their occurrence, and techniques to prevent or mitigate their effects. VI. Case Studies and Failure Prevention: The module aims to engage students with real-world case studies of material failures in engineering applications. Students will analyze these failures, identify the root causes, and propose strategies for failure prevention and improved material selection and design. VII. Safety and Ethical Considerations: The module aims to raise awareness among students about the ethical responsibilities of engineers in ensuring the safety and reliability of engineered materials and structures. VIII. Communication and Reporting: The module aims to develop students' ability to effectively communicate their findings and recommendations related to material failures. Students will learn how to write technical reports, present their analyses, and convey complex information to various stakeholders.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A. Knowledge Acquisition: Students should demonstrate a comprehensive understanding of the different failure mechanisms that can occur in engineering materials, including fracture, fatigue, creep, corrosion, and wear. They should possess knowledge of the causes, modes, characteristics, and influencing factors of these failures. B. Failure Analysis and Investigation: Students should have the skills to perform failure analysis of engineering materials using appropriate techniques and methodologies. They should be able to investigate failed components, conduct laboratory tests, analyze experimental and analytical results, and determine the root causes of material failures. C. Material Testing and Characterization: Students should be proficient in conducting mechanical tests and characterizing engineering materials. They should be able to perform tests such as tensile, hardness, and impact tests, and interpret the results to evaluate material properties, performance, and failure susceptibility. D. Fracture Mechanics: Students should possess a deep understanding of fracture mechanics principles and their application in predicting the behavior

	of cracked materials. They should be able to analyze stress distribution, assess crack propagation, calculate fracture toughness, and design against brittle fracture. E. Fatigue and Creep Analysis: Students should be able to analyze fatigue and creep failures in engineering materials. They should understand the factors influencing fatigue and creep behavior, estimate fatigue life, and propose strategies to prevent or mitigate fatigue and creep failures. F. Corrosion and Wear Assessment: Students should be able to assess corrosion and wear mechanisms and their effects on engineering materials. They should understand different types of corrosion and wear, evaluate factors contributing to their occurrence, and recommend measures to prevent or mitigate corrosion and wear failures. G. Case Studies and Failure Prevention: Students should be capable of analyzing real-world case studies of material failures in engineering applications. They should identify the root causes of failures, propose strategies for failure prevention, and suggest improved material selection and design practices. H. Safety and Ethical Considerations: Students should demonstrate an understanding of the ethical responsibilities of engineers in ensuring the safety and reliability of materials and structures. They should be aware of safety standards, codes of conduct, and regulations related to materials selection and failure prevention. I. Communication and Reporting: Students should be proficient in effectively communicating their findings and recommendations related to material failures. They should be able to write technical reports, present complex information, and convey their analyses to diverse stakeholders.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Failure Analysis and Fracture Mechanics, Importance of failure analysis in engineering, Usual causes of mechanical failure, The general types of mechanical failure, General steps of failure investigation Fracture Mechanics, Fracture mechanics analysis , Basics of Fracture Toughness, Griffith Energy Criteria, Fracture modes , Linear-Elastic Fracture Mechanics, Crack Tip Stresses , Plane strain and plane stress concept , Stress intensity factor, Relationship between fracture and the stress intensity factor Fracture Toughness Testing, Crack plane orientation, K Computation, Plastic-zone considerations, Yield Strength influences, Specimen Thickness, Test Procedure, Fracture toughness specimen preparation, load measurement and validation criteria, crack depth measurements and validation criteria, the provisional fracture toughness measurements and validation criteria, ASTM Standard E399 requirements. Modes of fracture, Fracture Morphology and Fractography, Ductile fracture characterization, Moderately ductile fracture, Stable and unstable crack, Ductile Fracture Morphology, Brittle Fracture characterization, Brittle Fracture Fractography, Brittle fracture initiation and propagation

	Fatigue Failure: Fatigue phenomenon and fatigue life estimation, S-N curves and fatigue strength, Factors affecting fatigue behavior: stress, surface finish, environment and Fatigue testing and analysis techniques. Creep, Creep Stages, Primary creep characterization, Secondary creep characterization, Tertiary creep characterization, Effect of Temperature & Stress on creep , identification of failures caused by creep , Mechanisms of deformation, Bulk Diffusion (Nabarro-Herring creep) , Grain Boundary Diffusion (Coble creep) , Dislocation climb/creep , Thermally activated glide , General Mechanisms of Creep, Dislocation slip, Climb, Grain-boundary sliding, Diffusion flow caused by vacancies. Material Testing and Characterization: Mechanical testing: tensile, hardness, impact, fatigue tests, Microstructural characterization: microscopy techniques (optical, electron) and Chemical analysis techniques: spectroscopy, X-ray diffraction (XRD) and Non-destructive testing (NDT) methods and their applications. Failure Analysis Techniques: Overview of failure analysis techniques, Microscopic examination and sample preparation, Spectroscopic analysis: SEM-EDS, X-ray spectroscopy and Mechanical testing for failure analysis. Case Studies and Failure Analysis Reports: Analysis of real-world case studies of material failures, Root cause identification and analysis and Preparation of failure analysis reports . Safety and Ethical Considerations in Failure Prevention: Safety standards, regulations, and codes of conduct, Ethical responsibilities in failure prevention and materials selection and Environmental and societal impact of material failures. Communication and Presentation Skills: Technical report writing for failure analysis, Effective communication of failure analysis findings and Presentation skills for sharing failure analysis results.

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Failure Analysis and Fracture Mechanics, Importance of failure analysis in engineering, Usual causes of mechanical failure, The general types of mechanical failure, General steps of failure investigation
Week 2	Failure Due to Fracture, Modes of fracture, Fracture Morphology and Fractography.
Week 3	Fracture Mechanics, Fracture mechanics analysis , Basics of Fracture Toughness, Griffith Energy Criteria, Fracture modes , Linear-Elastic Fracture Mechanics, Crack Tip Stresses , Plane strain and plane stress concept , Stress intensity factor, Relationship between fracture and the stress intensity factor Fracture Toughness Testing,

Week 4	Crack plane orientation, K Computation, Plastic-zone considerations, Yield Strength influences, Specimen Thickness, Test Procedure, Fracture toughness specimen preparation, load measurement and validation criteria, crack depth measurements and validation criteria, the provisional fracture toughness measurements and validation criteria, ASTM Standard E399 requirements.
Week 5	Modes of fracture, Fracture Morphology and Fractography, Ductile fracture characterization, Moderately ductile fracture, Stable and unstable crack, Ductile Fracture Morphology, Brittle Fracture characterization, Brittle Fracture Fractography, Brittle fracture initiation and propagation
Week 6	Fatigue, S–N Curve, Fatigue limit, Fatigue strength and Fatigue life, Fatigue Crack stages
Week 7	Fatigue Crack propagation by blunting and sharpening process, Microscopic Characteristics of Fatigue Fracture, Striations, Macroscopic Characteristics of Fatigue Fracture, Beach marks Ratchet marks, Fatigue Crack Growth Life, Crack Length rate Measurement
Week 8	Wear, Abrasive wear (Erosive wear, Grinding wear and Gouging wear), Adhesive wear and Fretting wear
Week 9	Contact stress fatigue, Subsurface-origin fatigue, Surface-origin fatigue, Subcase-origin fatigue, Cavitation fatigue
Week 10	Creep, Creep Stages, Mechanisms of deformation, General Mechanisms of Creep
Week 11	Mechanical Destructive Testing, Tensile Testing, Compression Test, Mechanical testing: tensile, hardness, impact, fatigue tests
Week 12	Failure Analysis Techniques, Overview of failure analysis techniques, Microscopic examination and sample preparation, Spectroscopic analysis: SEM-EDS, X-ray spectroscopy
Week 13	Case Studies and Failure Analysis Reports, Analysis of real-world case studies of material failures, Root cause identification and analysis, Preparation of failure analysis reports
Week 14	Safety and Ethical Considerations in Failure Prevention, Safety standards, regulations, and codes of conduct, Ethical responsibilities in failure prevention, Environmental and societal impact of material failures
Week 15	Communication and Presentation Skills, Technical report writing for failure analysis, Effective communication of failure analysis findings

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

Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Fundamentals of Engineering Materials" by Thornton, Peter A., and Vito J. Colangelo (1985).	Yes
Recommended Texts	" Materials Selection and Design" by M. A. Maleque and M. S. Salit (2013).	Yes
Websites		

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Heat Treatments			**Module Delivery**	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MAE352				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	26		**Semester of Delivery**	5	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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	I. To develop problem solving skills and understanding of heat treatments methods of metals and their alloys through the application of techniques. II. To understand annealing, normalizing and hardening treatments that can applied to metals and metals alloys. III. This course deals with the basic concept of heat treatments of ferrous and non-ferrous metal alloys. IV. This is the basic subject for all heat treatments types. V. To understand the response of metal alloys to heat treatments. VI. To understand how can applied it to improving the mechanical properties.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A. Recognize how heat treatments applied to most of ferrous and non-ferrous alloys. B. List the various types of heat treatments and their effects. C. Summarize what is meant by heat treatable alloys. D. Discuss the effects of alloying systems in the response of alloy to heat treatments. E. Describe heat treatments of ferrous alloys, their aim, and their resulting effect on both microstructure and mechanical properties. F. Define hardenability. G. Identify the basic requirement to heat treatments. H. Discuss the the thermochemical treatments. I. Discuss the precipitation hardening , martensitic transformation , and work hardening in non-ferrous metal alloys. J. Explain the effect associated with martensitic transformation (Hardening treatments) in some non-ferrous alloy.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part I- heat treatments of ferrous alloys.</u> Fundamentals of the heat treatment of Ferrous alloys, classification of ferrous metal alloys, steel, metallurgical phenomena, constitution of iron , alloying mechanisms of steel, iron cementite phase diagram, transformation of austenite [15 hrs] Introduction to Heat treatments, heat treatment processes, annealing treatments, normalizing , isothermal and continuous cooling transformations , hardening and tempering, hardenability, retained austenite and sub-zero treatment, austemper and

	martemper [15 hrs] Chemical heat treatment, theory of chemical heat treatment, case hardening , carborizing, post carborizing heat treatments, cyaniding , nitriding, nitrocarborizing and carbonitiding. [6 hrs] Heat treatments of commercial ferrous alloys, plain carbon steels, alloy steels, effect of alloying elements [15 hrs] Heat treatments of Cast iron, iron-graphite phase diagram, heat treatments of white cast iron, gray iron, ductile cast iron, malleable cast iron. [6 hrs] Part II– heat treatments of non ferrous metals and their alloys Fundamental heat treatments of non-ferrous metals and alloys, work hardening, annealing, basic requirements for hardening by precipitation hardening, precipitation hardening, martensitic transformation. [15 hrs] Heat treatments of copper and their alloys, heat treatments of copper metal, heat treatments of brass alloys , heat treatments of bronze alloys, heat treatments of aluminum alloy , heat treatable Al-alloys and non- heat treatable A-alloys [9hrs] Heat treatments of titanium alloys , heat treatments of nickel alloys , nitinol alloys and their heat treatments [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module

	is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Fundamentals of the heat treatment of Ferrous alloys, classification of ferrous metal alloys, steel, why steel is important, metallurgical phenomena,
Week 2	Constitution of iron , alloying mechanisms, iron cementite phase diagram, transformation of austenite
Week 3	Introduction to Heat treatments, heat treatment processes, annealing treatments, normalizing ,
Week 4	isothermal and continuous cooling transformations , hardening and tempering,
Week 5	hardenability, retained austenite and sub-zero treatment, austemper and martemper
Week 6	Chemical heat treatment, theory of chemical heat treatment, case hardening , carborizing,
Week 7	Mid-term Exam + post carborizing heat treatments, cyaniding , nitriding, nitrocarborizing and carbonitiding.
Week 8	Heat treatments of commercial ferrous alloys, plain carbon steels
Week 9	alloy steels, effect of alloying elements
Week 10	Heat treatments of Cast iron
Week 11	Fundamental heat treatments of non-ferrous metals and alloys, work hardening, annealing,.
Week 12	basic requirements for hardening by precipitation hardening, precipitation hardening, martensitic transformation
Week 13	Heat treatments of copper and their alloys and heat treatment of aluminum alloys
Week 14	Heat treatments of titanium alloys
Week 15	heat treatments of nickel alloys , nitinol alloys and their heat treatments

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

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: annealing and normalizing
Week 2	Lab 2: hardening and tempering
Week 3	Lab 3: end quenched test(hardenability test)
Week 4	Lab 4: case hardening
Week 5	Lab 5: surface hardening
Week 6	Lab 6: precipitation hardening
Week 7	Lab 7: martensitic transformation in copper alloy

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Heat Treatment Principles and Techniques ,second edition, T.V. Rajan, C.P. Sharma and Ashok Sharma	Yes
Recommended Texts	Materials Science and Engineering, 10th edition, WILLIAM D. CALLISTER, JR. and DAVID G. RETHWISCH	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Corrosion I**	**Module Delivery**
Module Type	**Core**	☒ **Theory**

Module Code	**MAE353**			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	28		**Semester of Delivery**	5	
Administering Department	Materials		**College**	Engineering	
Module Leader	Adnan S. Jabur		**e-mail**	adnan.jabur@uobasrah.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/06/2023		**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	The aim of this course is to give students an expanded idea of the problem of metal corrosion, its types, causes, measurement, and how to avoid and protect against it through coatings and others.
Module Learning Outcomes	1- An ability to apply knowledge of science, and engineering 2- An ability to design and conduct experiments, as well as to analyze and

مخرجات التعلم للمادة الدراسية	interpret data. 3- An ability to identify, formulate, and solve engineering problems. 4- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. 5- The ability to design and select engineering materials for scientific and industrial applications. 6- The ability to think about solving problems related to the use of engineering materials and methods of avoiding them. 7- Writing scientific reports, reading blueprints and analyzing engineering materials. 8- The ability to keep pace with developments in engineering materials and
Indicative Contents المحتويات الإرشادية	1- Introduction which includes the definition, cost, environments, classification and measurement of corrosion rate. [7 hrs] 2- The electrochemical corrosion which classified into general and localized corrosion. [7 hrs] 3- Galvanic corrosion. [7 hrs] 4- Crevice corrosion. [7 hrs] 5- Pitting corrosion. [7 hrs] 6- Intergranular corrosion. [7 hrs] 7- Stress corrosion. [7 hrs] 8- Erosion corrosion. [7 hrs] 9- Cavitation damage. [7 hrs] 10- Selective Leaching. [7 hrs] 11- Fretting corrosion. [7 hrs] 12- Corrosion Fatigue. [7 hrs] 13- Hydrogen Damage. [7 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures.

	2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10

Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction which includes the definition, cost, environments, classification and measurement of corrosion rate
Week 2	General and localized corrosion
Week 3	The electrochemical corrosion Types
Week 4	Galvanic corrosion
Week 5	Crevice corrosion
Week 6	Intergranular corrosion
Week 7	Stress corrosion
Week 8	Erosion corrosion
Week 9	Cavitation damage
Week 10	Selective Leaching
Week 11	Fretting corrosion
Week 12	Corrosion Fatigue
Week 13	Hydrogen Damage
Week 14	Protection methods
Week 15	Case studies
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to corrosion experiments
Week 2	Lab 2: Galvanic couples
Week 3	Lab 3: Pitting corrosion
Week 4	Lab 4: Crevice corrosion
Week 5	Lab 5: Sensitization of stainless steel
Week 6	Lab 6: Electroplating of steel
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Corrosion, M.G. Fontana, McGraw-Hill Education	Yes
Recommended Texts		
Websites		

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

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Heat Transfer**	**Module Delivery**
Module Type	**Basic learning activities (B)**	☒ **Theory**

Module Code	**MAE354**			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	29		**Semester of Delivery**	5	
Administering Department	Material		**College**	Engineering	
Module Leader	Qais A. Rishack		**e-mail**	qais.rashck@uobasrah.edu.iq	
Module Leader's Acad. Title	Assit. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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	**The objective of studying heat transfer by conduction is to identify the most important methods of heat transfer. Also, learn about the diffusion equation in heat transfer and derive its mathematical model. This course aims to learn how to calculate the rate of heat transfer by conduction through solid bodies for different shapes and coordinates. Also, in this course the student will study the transfer of heat by convection to identify this type of heat transfer methods and its most important types and the mathematical**

	equations for each type and how to calculate the heat transfer rate for the internal and external flow. The course also aims to calculate the rate of heat transfer by forced convection and in the different types of heat exchanger and the most mathematical equations used in these types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Knowledge and Understanding A1. An ability to apply knowledge of mathematics, science, and engineering A2. An ability to design and conduct experiments, as well as to analyze and interpret data. A3. An ability to identify, formulate, and solve engineering problems. A4. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. B. Subject-specific skills B1. The ability to design and select engineering materials for scientific and industrial applications. B2. The ability to think about solving problems related to the use of engineering materials and methods of avoiding them. B3. Writing scientific reports, reading blueprints and analyzing engineering materials. B4. The ability to keep pace with developments in engineering materials and their properties.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Conduction Heat Transfer</u> -Heat Transfer Method [7 hrs]. -Conduction heat transfer, Initial and boundary conditions, Heat diffusion equation in different coordinates. [15 hrs]

	-Temperature distribution through plane and composite walls, Insulation systems, Thermal and contact resistance , Temperature distribution in radial systems, Temperature distribution in sphere systems, Extended surface (Fins), study the performance of fins, Determination of heat transfer. [20 hrs] <u>Part B – Convection Heat Transfer</u> -Convection boundary layers, velocity boundary layer , thermal boundary layer, laminar and Turbulent flow, convection transfer equation , Reynolds, Prandtl and Grashof Numbers. [12 hrs] -External flow, empirical correlations , Flat plate in parallel flow, mixed boundary layer. [8 hrs] -Internal flow, Fully developed region, Laminar flow in circular tubes, Turbulent flow in circular tube, Noncircular tubes. [12 hrs] - Overall heat exchanger coefficient , Heat exchanger analysis, Log Mean Temperature difference Method , The Effectiveness-NTU Method . [16 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects. 6- Scientific visits. 7- Seminars held in the department.

	8- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Heat transfer methods, Conduction heat transfer.
Week 2	Initial and boundary conditions , Heat diffusion equation in different coordinates.
Week 3	Temperature distribution through plane and composite walls .
Week 4	Insulation systems , Thermal and contact resistance .
Week 5	Temperature distribution in radial systems , Temperature distribution in sphere systems .
Week 6	Extended surface (Fins), Study the performance of fins.
Week 7	Determination of heat transfer rate.
Week 8	Convection boundary layers, Velocity boundary layer, Thermal boundary layer.
Week 9	Laminar and turbulent flow, Convection transfer equation, Reynolds, Prandtl and Grashof Numbers.
Week 10	External flow, empirical correlations , Flat plate in parallel flow , mixed boundary layer.

Week 11	Fully developed region , laminar flow in circular tubes.
Week 12	Turbulent flow in circular tubes and noncircular tubes.
Week 13	Overall heat exchanger coefficient and heat exchanger analysis.
Week 14	Overall heat exchanger coefficient and heat exchanger analysis and Log mean temperature difference method.
Week 15	The Effectiveness-NTU method.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Calibration of Thermocouples.
Week 2	Thermal conductivity measurement.
Week 3	Study the performance of fins.
Week 4	Cross-flow heat Exchanger.
Week 5	Forced convection heat transfer.
Week 6	Free convection heat transfer.
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Heat and Mass Transfer, by Frank P. Incropera and David P. DeWitt, 2002.	Yes
Recommended Texts	Heat Transfer A Practical Approach , by Yunus A. Cengel, second edition, 2002.	No
Websites	Libraries sites in some scientific universities.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Numerical Analysis**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E361**				
ECTS Credits	**6**				
SWL (hr/sem)	150				
Module Level	6		**Semester of Delivery**	30	
Administering Department	MAE		**College**	ENGINEERING	
Module Leader	Imad Obaid Al-Fahad		**e-mail**	emad.bajee@uobasrah.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	1. Preparing and qualifying engineers to meet the requirements of the labor market in the private and public sectors in materials engineering. 2. Providing distinguished academic programs in the field of materials engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Developing and improving scientific research in the fields of materials engineering, writing programs for solving differential equations and complex functions, data processing, digital signal analysis and control. 4. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills. 5. Building and developing partnerships with the governmental and private sectors and the community with all its various institutions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A. Knowledge and Understanding** A1- Clarify the basic concepts of Numerical Analysis and their applications in social and industrial fields. A2- Acquiring the skill in dealing with and addressing problems through the acquired sciences in this field. A3- Acquisition of basic skills to solve engineering problems. A4- Gaining experience in describing engineering problems numerically and finding related equations to solve them. **B. Subject-specific skills** B1 - The ability to solve mathematical equations numerically. B 2 - The ability to think about addressing problems according to the algorithms and methods of their work. B 3 - Writing scientific reports, reading charts, and analyzing digital data.
Indicative Contents المحتويات الإرشادية	**Roots of equations (10 hrs.)** introduction, bisection, Newton's Raphson, modified Newton's method, The secant Method, root solving as inverse interpolation **Interpolation and extrapolation (20 hrs.)** Gregory Newton interpolation, central differences, non-equally spaced data ,

	Lagrange Polynomials, cubic spline functions, extrapolation. **Finite Difference calculus (20 hrs.)** Forward and backward Differences, higher order expressions, central differences, differences and polynomials. **Solution of algebraic equations (20 hrs.)** Gauss and Gauss-Jordan Elimination, Gauss siedel iteration **Curve fitting (30 hrs.)** Least squares curve fitting of discrete points, the approximation of continuous function. **Numerical Integral (10 hrs.)** Trapezoidal rule, Simpson's rule, Gauss Quadrature, dealing with singularities. **Solution of ordinary differential equations (20 hrs.)** General initial value problem, euler method, truncation error, convergence and stability, runge-kutta type formulas, predictor-corrector methods, the solution of sets of simultaneous first order differential equations. **Solution of partial differential equations (20 hrs.)** Solution of Laplace equations, Poisson's equations, 1-Dim Wave equations and 1-Dim Diffusion equation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Teaching and Learning Methods** 1. Explanation and clarification through lectures. 2. Using data show, smart boards, and plasma screens. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars held in the department.

	8. Mid-term and summer training. **Assessment methods** 1. Short exams (quizzes). 2. Homework. 3. Semester and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interaction within the lecture. 6. Reports

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fixed-point, Newton-Raphson
Week 2	Iteration method
Week 3	Gauss Elimination method
Week 4	Gauss-Jordan method
Week 5	Forward, Backward and Central differences
Week 6	Newton Interpolation
Week 7	Lagrange Interpolation
Week 8	Polynomial fitting
Week 9	Exponential and Power Fitting
Week 10	Trapezoidal and Simpson methods

Week 11	Euler method, Runge Kutta method
Week 12	Runge Kutta Second Order method
Week 13	Solution of Laplace Equation
Week 14	Solution of the Wave Equation
Week 15	Solution of Diffuse Equation

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. An Introduction to Numerical Analysis. Endre Suli.	Yes

	2. Advanced Engineering Mathematics, Kreyszig, Jon Wylie and Sons. 3. Mathematical Methods for Engineers and Scientists, K. T. Tang 4. Numerical Methods, Robert W. Hornbeck, Quantum Publishers Inc.	
Recommended Texts		
Websites		

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

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	**Behavior of Engineering Materials (II)**			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE361**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		6	**Semester of Delivery**		31
Administering Department		Material	**College**		Engineering
Module Leader	Hayder Qassem		**e-mail**		ha@uobasrah.edu.iq

Module Leader's Acad. Title	Senior 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	The module provides an introduction to the science and engineering of the behaviour of engineering materials, by define the nature of engineering materials and understanding the internal structural systems of them in terms of atomic bonding and crystalline shapes. Therefore, the ability to understand the relationship between the microstructures and the external properties of industrial materials and their engineering behaviour as a function of loads and properties. Moreover, their industrial features. The course provides good knowledge about the behaviour of engineering materials according to their mechanical, electrical, magnetic and optical properties. Additionally, the relationship of this behaviour to different applications, service conditions and life span of these engineering materials.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Knowledge and Understanding A1. An ability to apply knowledge of mathematics, science, and engineering A2. An ability to design and conduct experiments, as well as to analyze and interpret data. A3. An ability to identify, formulate, and solve engineering problems. A4. An ability to use the techniques, skills, and modern engineering tools

	necessary for engineering practice. B. Subject-specific skills B1. The ability to design and select engineering materials for scientific and industrial applications. B2. The ability to think about solving problems related to the use of engineering materials and methods of avoiding them. B3. Writing scientific reports, reading blueprints and analyzing engineering materials. B4. The ability to keep pace with developments in engineering materials and their properties.
Indicative Contents المحتويات الإرشادية	Fracture Mechanics in Polymers, Chain scission , Disentanglement , Shear Yielding , Crazing , Fracture of Ceramic, Ceramic fracture characterization, Thermal shock failure of ceramics, Contact failure, Factors Affecting the Fracture of a Material, Stress Concentration, Speed of loading, Temperature, Thermal shock Failure in composite materials, Failure in polymer matrix composites, unidirectional composites, cross-ply laminates, fibre buckling and the formation of kink bands, Failure in metal matrix composites, discontinuous reinforcement, continuous fibre reinforcement, Failure in ceramic matrix composites, particulate reinforcement, continuous fibre reinforcement Fatigue Crack propagation by blunting and sharpening process, Microscopic Characteristics of Fatigue Fracture, Striations, Striation Formation Mechanism, Striation characterization, striations visibility, Macroscopic Characteristics of Fatigue Fracture, Beach marks, forming the Beach marks, Beach marks characterization, Ratchet marks, Ratchet marks characterization , Fatigue Crack Growth Life, Crack Length rate Measurement Wear failure, Abrasive wear, Two body abrasion, Three body abrasion, Microscopic mechanisms of abrasive wear, Prevention of Abrasive wear, Erosive wear, Erosive wear characterization, Grinding wear, Prevention of Grinding wear, Gouging wear, Adhesive wear , micromechanism of adhesive wear, Fretting wear, recognize the Fretting wear, Prevention of fretting wear Contact stress fatigue, Subsurface-origin fatigue, The subsurface-origin pitting fatigue mechanism, Surface-origin fatigue, Characterization of the Surface-Origin Fatigue damage , Surface-Origin Fatigue cracks enlarge Subcase-origin fatigue, Characterization of the Subcase-origin fatigue damage, Prevention Subcase-origin fatigue, Cavitation fatigue, Principles of Cavitation Fatigue, cavitation pitting fatigue progress, Relationship between Corrosion and cavitation pitting fatigue, Prevention of cavitation fatigue Mechanical Destructive Testing, Tensile Testing, Compression Test, Mechanical testing: tensile, hardness, impact, fatigue tests Case Studies and Failure Analysis Reports, Analysis of real-world case studies of material failures, Root cause identification and analysis, Preparation of failure analysis reports

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	1-. Main method is chalk and talk (naked lecture). 2-. Explanation and clarification through lectures 3- Self-learning through homework, mini-projects and problems within. 4- Laboratories. 5- Scientific visits. 6- Seminars held in the department. 7- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Engineering materials definition, description and classification
Week 2	Entity of the engineering materials, atomic bonding
Week 3	Atomic bonding types of different engineering materials
Week 4	Crystal structure of the engineering materials, metallic, polymeric and ceramics
Week 5	Mechanical behaviour of materials
Week 6	Mechanical properties 1, elasticity
Week 7	Mechanical properties 2, plasticity
Week 8	Stress, strain and Poisson's ratio
Week 9	Elastic moduli
Week 10	Fatigue and failure
Week 11	Magnetic behaviour of materials and their properties
Week 12	Magnetic field, hysteresis, domain and applications
Week 13	Electrical behaviour of materials and their properties, conductors and insulators
Week 14	Thermal behaviour of materials, heat conductors and insulators
Week 15	Optical behaviour and properties of the engineering materials and their application

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Cantilever Beam Strain Gage Experiment
Week 2	Column Buckling Experiment
Week 3	Fracture of material Experiment
Week 4	Thermal expansion experiment
Week 5	Electrical behaviour as a function of mechanical stress
Week 6	Optical behaviour inspection
Week 7	Cantilever Beam Strain Gage Experiment

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Materials handbook, by François Cardarelli	No
Recommended Texts	Materials for Engineers ،William F. Hosford	No
Websites	Relevant scientific and industrial websites, journals and libraries.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Ceramic Materials**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MAE362				
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level		32	**Semester of Delivery**		6
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Zahraa Adnan Hamza & Mohammed Yaqoob Yousif		**e-mail**	lec.mohammed.yousif@uobasrah.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	The objective of this course is to give the students the ability of understanding the structure and properties of ceramic materials that qualify them designing and Selection of these materials in different technological products.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	I. The principle knowledge of ceramic materials II. Understanding the accurate details of structure and properties. III. The ability to deal with ceramic materials. IV. The ability to prepare of ceramic mixtures, forming and sintering. V. Define and explain Atomic-, micro-structure, properties of typical ceramics. VI. List, discuss, apply and assess properties of ceramics materials VII. List, discuss, apply and assess process of ceramics materials VIII. Analyze microstructure-property-structure relationship of ceramic.
Indicative Contents المحتويات الإرشادية	

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Ceramics
Week 2	Elementary Crystallography
Week 3	Ceramic Crystal Structure
Week 4	Traditional Ceramics and Advanced Ceramics
Week 5	Manufacturing Process of ceramics
Week 6	Manufacturing Process of ceramics
Week 7	Thermodynamics of Sintering
Week 8	Solid State of Sintering
Week 9	Liquid State of Sintering
Week 10	Sintering Mechanisms
Week 11	Refractories
Week 12	Structural Ceramics
Week 13	Bioceramics
Week 14	Alumina Ceramics
Week 15	Zirconia, Ceramic Steel

Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Sieving Analysis
Week 2	Lab 2: Ceramic Compaction and Sintering
Week 3	Lab 3: Thermal Conductivity
Week 4	Lab 4: Electrical Resistivity
Week 5	Lab 5: Compression Strength
Week 6	Lab 6: Water absorption
Week 7	Lab 7: Ceramography

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Ceramic Materials, Science and Engineering C. B. Carter and M. G. Norton	Yes
Recommended Texts		
Websites		

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

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	**Corrosion II**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☒ **Lecture**
Module Code	**MAE363**	

ECTS Credits	**6**			☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
SWL (hr/sem)	**150**				
Module Level	33		**Semester of Delivery**	6	
Administering Department	Materials		**College**	Engineering	
Module Leader	Adnan S. Jabur		**e-mail**	adnan.jabur@uobasrah.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/06/2023		**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	This course aims to teach the student how to employ the electrochemical theory in characterizing wet corrosion cases as well as in measuring the speed and rate of corrosion in a faster and more accurate way than traditional methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- An ability to apply knowledge of science, and engineering 2- An ability to design and conduct experiments, as well as to analyze and interpret data. 3- An ability to identify, formulate, and solve engineering problems. 4- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

	5- The ability to design and select engineering materials for scientific and industrial applications. 6- The ability to think about solving problems related to the use of engineering materials and methods of avoiding them. 7- Writing scientific reports, reading blueprints and analyzing engineering materials. 8- The ability to keep pace with developments in engineering materials and
Indicative Contents المحتويات الإرشادية	1. Introduction to the modern theory of corrosion [7 hrs] 2. The electrochemical corrosion which classified into general and localized corrosion. [7 hrs] 3. Equilibrium and polarization. [7 hrs] 4. Activation polarization. [7 hrs] 5. Concentration polarization. [7 hrs] 6. Mixed potential Theory. [7 hrs] 7. Passivity. [7 hrs] 8. Mixed potential theory applications (effect of oxidizers). [7 hrs] 9. Effect of velocity. [7 hrs] 10. Measurement of corrosion rate. [7 hrs] 11. Galvanic effect. [7 hrs] 12. Anodic and Cathodic protection. [7 hrs] 13. Case studies. [7 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the modern theory of corrosion
Week 2	The electrochemical corrosion which classified into general and localized corrosion
Week 3	The electrochemical corrosion Types
Week 4	Equilibrium and polarization
Week 5	Activation polarization
Week 6	Concentration polarization
Week 7	Mixed potential Theory
Week 8	Passivity
Week 9	Mixed potential theory applications (effect of oxidizers)

Week 10	Effect of velocity
Week 11	Measurement of corrosion rate
Week 12	Galvanic effect
Week 13	Anodic and Cathodic protection
Week 14	Protection methods
Week 15	Case studies
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to corrosion experiments
Week 2	Lab 2: Half Cells
Week 3	Lab 3: Standard Electrodes
Week 4	Lab 4: Potentiostatic polarization
Week 5	Lab 5: Tafel method
Week 6	Lab 6: Linear polarization
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Corrosion, M.G. Fontana, McGraw-Hill Education	Yes
Recommended Texts		
Websites		

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

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Polymers Engineering**			**Module Delivery**	
Module Type	**Basic learning activities (B)**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE364**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		34	**Semester of Delivery**		6
Administering Department		Materials Engineering	**College**	Engineering	
Module Leader	Safaa A. S. Almtori		**e-mail**	Safaa.saleh@uobasrah.edu.iq	
Module Leader's Acad. Title		Assit. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	

Scientific Committee Approval Date	01/06/2023	**Version Number**	3.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	**The objective of studying polymers engineering is to identify the most important knowledge of polymers. Also, learn about the different types of polymers (thermoplastic and thermosetting) as well as natural and synthetic polymers , homopolymers ,copolymers and polymer alloys . This course aims to learn and gave the knowledge about how the polymers produces by different polymerization process according to the type of polymers by changing functionality numbers in functional solid bodies for different polymers and polymerization process. Also, in this course the student will study the types of repeating units of molecules by different shapes and molecular weight of chains arrangement like linear or branching or crosslinking chains according to types of repeating units of polymers to identify the type of polymers which are used in application to most important types and to improvement the mechanical properties for each type of polymers, and how to calculate the crystallization ratio for the different polymers as a function of density of specimen and crystal , amorphous zones in polymers. The course also aims to study the effect of heat transfer by cooling the melt of polymers on the consisting the crystal zone and growth it for the different types of zone during solidification , and study the glass transition temperature role during the process, in addition to** measuring mechanical and physical properties .
Module Learning	

Outcomes مخرجات التعلم للمادة الدراسية	A- Knowledge and Understanding A1. An ability to apply knowledge of polymers, types, and engineering applications A2. An ability to preparation and conduct experiments, as well as to chose appropriate polymers . A3. An ability to identify, and solve polymers engineering problems. A4. An ability to use the techniques, skills, and engineering tools necessary for engineering applications. B. Subject-specific skills B1. The ability to design and select engineering polymers for scientific and industrial applications. B2. The ability to think about solving problems related to the use of engineering polymers material and methods of avoiding them. B3. Writing scientific reports, reading blueprints and analyzing polymers engineering materials. B4. The ability to keep pace with developments in engineering polymers material and their properties.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – principles of polymers engineering</u> - Polyethylene types, properties and application [8 hrs]. -types of polymers, uses of polymers, structures, types of chains, molecular weight , applications, polymerization process , types of repeating unites , homopolymers ,copolymers ,cross-linked polymer, polymer alloys, molecular symmetry and distribution , structure of crystal polymers , helices of polymers , theory of crystal polymers , crystallinity and specific volume of polymers , crystallization and melting of polymers , conditions of crystallization, melting temperature and relative molecular weight of polymers.[12 hrs] -melting temperature and the temperature of the maximum crystallization rate, glass transition temperature , specific volume and glass transition temperature, molecular structure of amorphous polymers , the number of random molecular structure , the freely jointed chain of polymers , the elastic properties of natural rubber , stress-strain relationship, the work done of deformation polymers .[10 hrs] <u>Part B– Engineering rubber</u>

	Properties of rubbers, vulcanization rubber, reinforcing rubbers, history of synthetic and types of rubber production , introduction of viscoelasticity , the nature of viscoelasticity, linear and nonlinear viscoelasticity , A thin-walled tube method. [12 hrs] -creep compliance , stress relaxation , dynamic properties, torsion pendulum to determination shear modulus and damping forces, theory of linear viscoelasticity, voigt and maxwell models , weakness of mechanical models, reinforced polymers , types of reinforcing fillers , the effect of reinforcing fillers on cost and processing . [18 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects. 6- Scientific visits. 7- Seminars held in the department. 8- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1.5 hr	20% (10)	7	LO # 1-7
	Final Exam	2 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Polyethylene types, properties and application .
Week 2	types of polymers, uses of polymers, structures, types of chains, molecular weight , applications, polymerization process
Week 3	, types of repeating unites , homopolymers ,copolymers ,cross-linked polymer, polymer alloys
Week 4	molecular symmetry and distribution , structure of crystal polymers , helices of polymers ,

	theory of crystal polymers , crystallinity and specific volume of polymers
Week 5	molecular structure of amorphous polymers , the number of random molecular structure , the freely jointed chain of polymers
Week 6	the elastic properties of natural rubber , stress-strain relationship, the work done of deformation polymers
Week 7	theory of crystal polymers , crystallinity and specific volume of polymers
Week 8	crystallization and melting of polymers , conditions of crystallization, melting temperature and relative molecular weight of polymers.[
Week 9	melting temperature and the temperature of the maximum crystallization rate, glass transition temperature , specific volume and glass transition temperature
Week 10	molecular structure of amorphous polymers , the number of random molecular structure
Week 11	the freely jointed chain of polymers , the elastic properties of natural rubber , stress-strain relationship, the work done of deformation polymers
Week 12	Properties of rubbers, vulcanization rubber, reinforcing rubbers, history of synthetic and types of rubber production , introduction of viscoelasticity
Week 13	the nature of viscoelasticity, linear and nonlinear viscoelasticity , A thin-walled tube method.
Week 14	creep compliance , stress relaxation , dynamic properties, torsion pendulum to determination shear modulus and damping forces, theory of linear viscoelasticity,
Week 15	voigt and maxwell models , weakness of mechanical models, reinforced polymers , types of reinforcing fillers , the effect of reinforcing fillers on cost and processing .

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Shore hardness test.
Week 2	Thermal conductivity measurement.
Week 3	Creep test
Week 4	Tension test

Week 5	Impact test.
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Principle of polymer engineering by N.G.Mccrum	Yes
Recommended Texts	Plastic engineering by Crawford	No
Websites	Libraries sites in some scientific universities.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**MECHANICAL DESIGN**			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE471**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	35		**Semester of Delivery**	7S	
Administering Department	MAE		**College**	ENGINEERING	
Module Leader	AZZAM DAWOOD HASSAN		**e-mail**	AZZAM.HASSAN@UOBASRAH.EDU.IQ	
Module Leader's Acad. Title	ASST. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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	**The objective of this course is to introduce students to fundamental area of mechanical design processes which enables students to focus on the study of design effecting factors, physical and mechanical properties of materials. These principals allow the students to assess what could be achieved through this course when they are identifying of design to solve problems in industries.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Knowledge and Understanding A1. An ability to apply knowledge of mathematics, science, and engineering. A2. An ability to design and conduct experiments, as well as to analyze and interpret data. A3. An ability to identify, formulate, and solve engineering problems. A4. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. B. Subject-specific skills B1. The ability to design and select engineering materials for scientific and industrial applications. B2. The ability to think about solving problems related to the use of engineering materials and methods of avoiding them. B3. Writing scientific reports, reading blueprints and analyzing engineering materials. B4. The ability to keep pace with developments in engineering materials and their properties.
Indicative Contents	The course cover: Stress analysis

المحتويات الإرشادية	Strain analysis, Bending, Torsion, pressure vessels Design for static strength Theories for ductile materials max. Stress theory, max. Shear stress theory, distortion energy theory, theories for brittle materials, Coulomb –Mohr theory, modified Coulomb –Mohr theory. Design for fatigue strength Stress life definitions, the endurance limit, the fatigue strength, endurance limit modifying factors, fluctuating stresses, stress concentration factor, fatigue strength under fluctuating stresses, design for infinite life Design of springs Stresses in helical springs, the curvature effect, deflection of helical springs, extension springs, compression springs, spring materials, design of helical spring, critical frequency, fatigue loading, helical torsion springs, leaf spring
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Laboratories. 5- Graduation projects. 6- Scientific visits. 7- Seminars held in the department. 8- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	107	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Mechanical Engineering Design(Mechanical Engineering Design, Standards and Codes, Design Factor and Factor of Safety)
Week 2	**Load and Stress Analysis**(Mohr's Circle for Plane Stress, Stress Concentration
Week 3	Stresses in Pressurized Cylinders, Curved Beams in Bending)

Week 4	Failures Resulting from Static Loading(Static Strength, Stress Concentration, Failure Theories, Maximum-Shear-Stress Theory for Ductile Materials, Distortion-Energy
Week 5	Theory for Ductile Materials, Coulomb-Mohr Theory for Ductile Materials, Maximum-Normal-Stress
Week 6	Theory for Brittle Materials, Modifications of the Mohr Theory for Brittle Materials, Selection of Failure Criteria)
Week 7	**Fatigue Failure Resulting from Variable Loading(**Approach to Fatigue Failure in Analysis and Design, Fatigue-Life Methods, The Stress-Life Method, The Strain-Life Method,
Week 8	The Endurance Limit, Endurance Limit Modifying Factors, Stress Concentration and Notch Sensitivity, Fatigue Failure Criteria for Fluctuating Stress
Week 9	Combinations of Loading Modes
Week 10	**Design of Mechanical Elements(** Shafts and Shaft Components,
Week 11	Screws, Fasteners, and the Design of Nonpermanent Joints,
Week 12	Welding, Bonding, and the Design of Permanent Joints
Week 13	Mechanical Springs
Week 14	Gears—General
Week 15	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Matlab - design of members - static design
Week 2	MatLab - design of members - static design
Week 3	MatLab - design of cylinders - static design
Week 4	MatLab - design of cylinders- static design
Week 5	MatLab - design of members - fatigue design
Week 6	MatLab - design of members - fatigue design
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the**

		Library?
Required Texts	Mechanical Design , 11th edition by Shigly	Yes
Recommended Texts		
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Non-Destructive Testing			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE472**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	36		**Semester of Delivery**	7	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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	1. Provide students with a comprehensive understanding of the principles, concepts, and importance of NDT techniques. 2. To familiarize students with different NDT methods such as ultrasonic testing, radiographic testing, magnetic particle testing, liquid penetrant testing, eddy current testing, and visual inspection. Students will learn about the working principles, advantages, limitations, and applications of each method. 3. Students will gain hands-on experience with NDT equipment and instrumentation. The module aims to teach students how to operate and calibrate NDT instruments, interpret readings, and troubleshoot common issues. Practical sessions will allow students to develop technical skills and understand the importance of proper equipment handling. 4. The module aims to introduce students to relevant standards and codes associated with NDT techniques. Students will learn about industry-specific regulations, safety guidelines, and quality assurance procedures. Understanding these standards is crucial for ensuring compliance and reliability in NDT inspections. 5. Defect Detection and Evaluation: The module aims to develop students' abilities to detect, identify, and evaluate defects or anomalies in materials or structures using NDT techniques. 6. Data Analysis and Reporting: Students will learn how to analyze NDT data and generate accurate reports.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge Acquisition: Students should demonstrate a comprehensive understanding of the principles, theories, and concepts of NDT techniques, including the different methods, equipment, and standards associated with NDT. 2. Method Selection and Application: Students should be able to select and apply appropriate NDT methods based on the material, component, or structure being inspected. They should understand the advantages, limitations, and applications of each method and make informed decisions in selecting the most suitable technique for a given scenario. 3. Equipment Handling and Calibration: Students should develop practical skills in operating and calibrating NDT equipment and instruments. They should be able to set up the equipment correctly, perform inspections, and troubleshoot common issues that may arise during testing. 4. Defect Detection and Evaluation: Students should be able to detect, identify, and evaluate defects or anomalies in materials or structures using NDT techniques. They should be able to interpret test results accurately and assess the severity and implications of detected defects.

	5. Data Analysis and Reporting: Students should demonstrate proficiency in analyzing NDT data, interpreting readings, and generating accurate reports. They should be able to communicate the results effectively, including documenting findings, providing recommendations, and adhering to industry-specific reporting standards. 6. Quality Assurance and Safety: Students should understand the importance of quality assurance and safety in NDT inspections. They should be aware of relevant standards, regulations, and guidelines and demonstrate the ability to apply them in practice to ensure reliable and safe testing procedures. 7. Problem-solving and Critical Thinking: Students should develop problem-solving and critical thinking skills in the context of NDT. They should be able to analyze complex scenarios, identify potential issues or challenges, and propose appropriate solutions or strategies. 8. Professionalism and Ethical Conduct: Students should exhibit professionalism, integrity, and ethical conduct in their NDT work. They should understand the importance of confidentiality, accuracy, and adherence to professional codes of conduct. 9. Industry Awareness and Emerging Technologies: Students should be familiar with industry applications of NDT techniques and be aware of emerging technologies and trends in the field. They should understand the evolving nature of NDT and be prepared to adapt to new advancements and challenges.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Non-Destructive Testing (NDT), Definition and importance of NDT, Principles and objectives of NDT and Applications of NDT in various industries [15 hrs] NDT Methods, Ultrasonic Testing (UT), Radiographic Testing (RT), Magnetic Particle Testing (MT), Liquid Penetrant Testing (PT), Eddy Current Testing (ET), Visual Inspection (VI) and Comparison of methods and their suitability for different materials and defects [15 hrs] NDT Equipment and Instrumentation, Overview of NDT equipment and instruments, Operation, calibration, and maintenance of NDT equipment and Introduction to transducers, probes, sensors, and imaging systems used in NDT [15 hrs] Standards and Codes in NDT, Overview of relevant industry standards and codes, Understanding regulatory requirements and compliance and Quality assurance Ultrasonic Testing (UT), Principles of ultrasonic wave propagation and interaction with materials, UT equipment and transducers, Interpretation of UT readings and detection of defects and Thickness measurement and flaw sizing using UT [15 hrs] Radiographic Testing (RT), Principles of radiographic imaging and exposure techniques, Film and digital radiography, Interpretation of radiographic images and identification of defects and Radiation safety and regulations in RT. [15 hrs]

	Magnetic Particle Testing (MT) and Liquid Penetrant Testing (PT), Principles of magnetic particle testing and liquid penetrant testing, Equipment and techniques for MT and PT and Detection and evaluation of surface and near-surface defects [15 hrs] Eddy Current Testing (ET), Principles of eddy current testing, Eddy current probes and instrumentation, Applications and limitations of ET and Conductivity and thickness measurement using ET [15 hrs] Visual Inspection (VI), Importance of visual inspection in NDT ,Visual inspection techniques and equipment and Defect recognition and evaluation through visual inspection [15 hrs] Data Analysis and Reporting, Interpretation and analysis of NDT data, Documentation and reporting of test results and Importance of clear and concise reporting in NDT [15 hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	107	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to NDT, Definition and importance of NDT, Principles and objectives of NDT and Applications of NDT in various industries
Week 2	Standards and Codes in NDT • Overview of relevant industry standards and codes • Understanding regulatory requirements and compliance • Quality assurance procedures and documentation in NDT inspections
Week 3	Visual Inspection (VI) • Importance of visual inspection in NDT • Visual inspection techniques and equipment • Advantages and limitations
Week 4	Liquid Penetrant Testing (PT) • Principles liquid penetrant testing • Equipment and techniques for PT • Detection and evaluation of surface defects • Advantages and limitations
Week 5	Magnetic Particle Testing (MT) • Principles of magnetic particle testing • Equipment and techniques for MT • Detection and evaluation of surface and near-surface defects • Advantages and limitations
Week 6	Eddy Current Testing (ET) • Principles of eddy current testing • Eddy current probes and instrumentation • Applications and limitations of ET

	• Conductivity and thickness measurement using ET
Week 7	Ultrasonic Testing (UT) • Principles of ultrasonic wave propagation • UT equipment and transducers • Interpretation of UT readings and detection of defects • Advantages and limitations
Week 8	•
Week 9	Radiographic Testing (RT) • Principles of radiographic imaging • RT equipment and exposure techniques • Interpretation of radiographic images and identification of defects • Advantages and limitations
Week 10	Thermography Testing • Principles of thermography testing • Thermography testing equipment • Interpretation of thermography images and identification of defects • Advantages and limitations
Week 11	Acoustic emission (AE) testing • Principles of Acoustic emission (AE) testing • AE equipment • Interpretation of Acoustic emission (AE) testing results and identification of defects with localization • Advantages and limitations
Week 12	Hardness testing • Principles of Hardness testing • Hardness testing techniques • Interpretation of Hardness testing results • Advanced Hardness testing techniques • Advantages and limitations
Week 13	Leak Testing • Definition and importance of Leak Testing • Principles of Leak Testing • Applications of Leak Testing in various industries • Advantages and limitations
Week 14	•
Week 15	Shearography Testing • Principles of Shearography testing • Shearography testing equipment • Interpretation of Shearography images and identification of defects • Advantages and limitations

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Liquid Penetrant Testing (PT)
Week 2	Lab 2: Ultrasonic Testing (UT)
Week 3	Lab 3: Magnetic Particle Testing (MT)
Week 4	Lab 4: Eddy Current Testing (ET)
Week 5	Lab 5: Visual Inspection (VI)
Week 6	Lab 6: Hardness Testing
Week 7	Lab 7: Acoustic Emission Testing (AE)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"NON-DESTRUCTIVE TESTING" by BARRY HULL and VERNON JOHN (1988).	Yes
Recommended Texts	"Non-Destructive Testing Techniques" by RAVI PRAKASH (2012).	Yes
Websites		

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

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

automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	POWDER METALLURGY			**Module Delivery**	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MAE473				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		37	**Semester of Delivery**		7
Administering Department		MAE	**College**	ENGINEERING	
Module Leader	KHULOOD I. DAOOD		**e-mail**	Khulood.dawood@uobasra.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	1. Preparing and qualifying engineers to meet the requirements of the labor market in the private and public sectors in materials engineering. 2. Providing distinguished academic programs in the field of materials engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Developing and improving scientific research in the fields of materials engineering, writing programs for solving differential equations and complex functions, data processing, digital signal analysis and control. 4. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills. 5. Building and developing partnerships with the governmental and private sectors and the community with all its various institutions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	33. Knowledge the powder properties . 34. Describe the testing methods of powder properties . 35. Characterize powder and their effect on final products. 36. Describe methods of powder productions. 37. Knowledge the effect of powder production methods on particle properties 38. Describe the powder compaction methods. 39. Classify the deferent compaction techniques 40. Define sintering process. 41. List the sintering methods and sintering atmosphere 42. Listing the powder metallurgy applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part I- powder charicterization. Chemical composition, Particle size and distribution, Particle shape, Specific surface, Apparent density, Flow rate, Pressing properties: Green density, Green strength, Green spring, Pressing properties: Green density, Green strength, Green spring, Properties of sintered compacts: Dimensional change during sintering, Sintered density, Porosity, Mechanical properties of sintered compacts [15 hrs] Powder Manufacturing Mechanical Processes: Machining, Crushing, Milling, Shotting, Graining, and Atomization.

	Physico-Chemical and Chemical Processes: Condensation method, Thermal decomposition method, Reduction method, Electrodeposition method, Precipitation from aqueous solution, Precipitation from fused salts, Gaseous reduction process, Intergranular corrosion, Oxidation and decarburization. [15 hrs] -Powder Conditioning: Preliminary heat treatment, Blending and mixing. [10 hrs] Powder Compaction. Pressureless shaping technique. [10hrs] Cold pressure shaping technique. [11 hrs] Part B – Pressure shaping technique: Pressure shaping technique with heat: Hot Pressing, Sinter forging, Hot rolling, Hot – Isostatic compaction, Spark sintering, Hot coining [12 hrs] Sintering Stages of sintering, Mechanisms of sintering, Liquid phase sintering, Infiltration, Sintering atmosphere,[12 hrs] Applications Bearing materials, Friction materials, Tool materials, Ferrites, Cermets Heat [13 hrs]

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

Student Workload (SWL)

الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Characterization and Testing of Metal Powders
Week 2	Chemical composition, Particle size and distribution, Particle shape, Specific surface, Apparent density, Flow rate
Week 3	Pressing properties: Green density, Green strength, Green spring
Week 4	- Properties of sintered compacts: Dimensional change during sintering, Sintered density, Porosity, Mechanical properties of sintered compacts Powder Manufacturing
Week 5	Mechanical Processes: Machining, Crushing, Milling, Shotting, Graining, and Atomization.
Week 6	Physico-Chemical and Chemical Processes: Condensation method, Thermal decomposition method, Reduction method
Week 7	Electrodeposition method, Precipitation from aqueous solution.
Week 8	Precipitation from fused salts, Gaseous reduction process, Intergranular corrosion, Oxidation and decarburization

Week 9	Powder Conditioning, Preliminary heat treatment, Blending and mixing
Week 10	Powder Compaction.
Week 11	Pressureless shaping technique
Week 12	Cold pressure shaping technique
Week 13	Pressure shaping technique with heat: Hot Pressing, Sinter forging, Hot rolling, Hot – Isostatic compaction, Spark sintering, Hot coining
Week 14	- Sintering: Stages of sintering, Mechanisms of sintering, Liquid phase sintering, Infiltration, Sintering atmosphere
Week 15	Applications: Bearing materials, Friction materials, Tool materials, Ferrites, Cermets
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: preparing metal powder by chemical method
Week 2	Lab 2 :preparing metal powder by mechanical method
Week 3	Lab 3: sieve analysis and shape examination of particle powder
Week 4	Lab 4: preparing green compact using uniaxial pressing
Week 5	Lab 5: effect of compaction pressure on green density
Week 6	Lab 6: effect of particle size on green density
Week 7	Lab 7: sintering of green compact in controlled atmosphere

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Powder metallurgy technology , G.S. Upadhyaya, *First published August 2002*	no
Recommended Texts	Powder metallurgy and particulate materials processing, R.M. German	No
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Composite Materials**			**Module Delivery**	
Module Type	**Basic learning activities (B)**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE474**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		38	**Semester of Delivery**		7
Administering Department		Materials Engineering	**College**	Engineering	
Module Leader	Safaa A. S. Almtori		**e-mail**	Safaa.saleh@uobasrah.edu.iq	
Module Leader's Acad. Title		Assit. Professor	**Module Leader's Qualification**		Ph.D.

Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	3.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The objective of studying composite materials is to identify the most important knowledge of composite materials. Also, learning about the different types of composites according to different matrix and fillers as well as all composites are synthetic composite materials . This course aims to learn and gave the knowledge about how to prepared composite materials and produces composite materials by different process depend on to the types of matrix and filler by changing both matrix and filler to produce different composite materials Also, in this course the student will study the types of shape of fillers because the different shapes and matrix will effect on the properties of the composites materials as well as on the reason of synthetic composites materials to identify the types of composites materials which are used in application. so we can to change the most important types and to improvement the mechanical properties for each type of composites materials, and how to use it in the different applications according to changing matrix or fillers. The course also aims to study the effect of composites materials on the life by tailoring composites materials which are consisting metals, polymers , cement and ceramic matrix with the different types of fillers fibers particles , and study mechanical and physical properties .
Module Learning Outcomes	A- Knowledge and Understanding A1. An ability to apply knowledge of composite, types, and engineering

مخرجات التعلم للمادة الدراسية	applications A2. An ability to preparation and conduct experiments, as well as to chose appropriate composite. A3. An ability to identify, and solve composite engineering problems. A4. An ability to use the techniques, skills, and engineering tools necessary for engineering applications. B. Subject-specific skills B1. The ability to design and select engineering composite for scientific and industrial applications. B2. The ability to think about solving problems related to the use of composite materials and methods of avoiding them. B3. Writing scientific reports, reading blueprints and analyzing problems engineering materials. B4. The ability to keep pace with developments in composite materials and their properties.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – introduction of composite materials</u> Definition of composite materials - classification of composite materials according to their matrix , properties and application [8 hrs]. -types of matrix, and additive , structures, tailored of composite materials, shape of fillers , applications, types of fibers, which are effect on tailoring composite materials, types of particles , structure of composite materials, comparison between composite materials matrix, fillers and properties , advantage and disadvantages of composite materials, [12 hrs] -fibers form and particles size, types of metals matrix, ceramic-matrix and types of fibers, types of glass matrix, structure of composite materials, continuous , short and woven fibers, fibers orientation, additive of cement matrix,[10 hrs] <u>Part B– processing of composite materials</u> Processing of composite materials depend on the cost and technology process, polymer-matrix composite, thermoset and thermoplastic matrix, types of thermoset and thermoplastic polymers, using fibers and particles additives, processing of polymers matrix, method of forming unidirectional fibers

	composite, fabrication of high performance polymer matrix composite, impregnation composite polymers matrix, . [12 hrs] -fabrication of metal-matrix composite methods , types of preform , mechanical properties of composite materials, fiber orientation effect on the tension test, isostress and isostrain , classified of carbon fibers, the effect of damage of composite materials on the mechanical properties , brittle and ductile composite materials, strengthening of composite materials ,vibration damping ability, viscoelastic behavior of polymer composite materials , tailoring composite materials, polymers in cement matrix composites, filler surface treatment types and technology, using organic coupling agent . [18 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Graduation projects. 5- Scientific visits. 6- Seminars held in the department. 8- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1.5 hr	20% (10)	7	LO # 1-7
	Final Exam	2 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction of composite materials .
Week 2	Definition of composite materials - classification of composite materials according to their matrix , properties and application
Week 3	types of matrix, and additive , structures, tailored of composite materials, shape of fillers
Week 4	applications, types of fibers, which are effect on tailoring composite materials, types of particles , structure of composite materials

Week 5	comparison between composite materials matrix, fillers and properties , advantage and disadvantages of composite materials
Week 6	fibers form and particles size, types of metals matrix, ceramic-matrix and types of fibers, types of glass matrix,
Week 7	structure of composite materials, continuous , short and woven fibers, fibers orientation, additive of cement matrix
Week 8	Processing of composite materials depend on the cost and technology process, polymer-matrix composite
Week 9	thermoset and thermoplastic matrix, types of thermoset and thermoplastic polymers, using fibers and particles additives
Week 10	processing of polymers matrix, method of forming unidirectional fibers composite, fabrication of high performance polymer matrix composite, impregnation composite polymers matrix
Week 11	fabrication of metal-matrix composite methods , types of preform , mechanical properties of composite materials
Week 12	fiber orientation effect on the tension test, isostress and isostrain
Week 13	classified of carbon fibers, the effect of damage of composite materials on the mechanical properties , brittle and ductile composite materials
Week 14	strengthening of composite materials ,vibration damping ability, viscoelastic behavior of polymer composite materials
Week 15	tailoring composite materials, polymers in cement matrix composites, filler surface treatment types and technology, using organic coupling agent

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

Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	composite materials science & applications by Deborah	Yes
Recommended Texts	Any book about composite materials	No
Websites	Libraries sites in some scientific universities.	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Selection of Engineering Materials**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE481**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	40		**Semester of Delivery**	8	
Administering Department	Materials		**College**	Engineering	
Module Leader	Ahmad K. Jassim		**e-mail**	ahmadkj1966@yahoo.com	
Module Leader's Acad. Title	Guest Lecture		**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	1/06/2023		**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	This course aims to teach the student how to select materials engineering for design and use as well as the main motivation of selection and selection process with some case study and applied CES Edu Pack software tutorial.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Ability to apply engineering and management principles, and knowledge of economic decision-making to manage projects. 2- Understanding of the impact of materials engineering solutions on the environment, and knowledge of materials and devices for sustainable development. 3- An ability to identify, formulate, and solve engineering problems. 4- Understanding of the impact of engineering solutions on society and the responsibilities of the discipline. 5- The ability to design and select engineering materials for scientific and industrial applications. 6- The ability to think about solving problems related to the use of engineering materials and methods of avoiding them. 7- Writing scientific reports, reading blueprints and analyzing engineering materials. 8- The ability to keep pace with developments in engineering materials and
Indicative Contents المحتويات الإرشادية	14- Introduction for selection of materials [7 hrs] 15- Selection process. [7 hrs] 16- Cost basis for selection of materials. [7 hrs] 17- Failure analysis. [7 hrs] 18- Selection for mechanical properties (Strength of materials). [7 hrs] 19- Selection for mechanical properties (Stuffiness). [7 hrs] 20- Selection for mechanical properties (Toughness). [7 hrs] 21- Selection for mechanical properties (Corrosion). [7 hrs] 22- Selection for mechanical properties (Cost). [7 hrs] 23- Case study: Materials property charts. [7 hrs] 24- Case study: The basics of materials selection. [7 hrs] 25- Case study: Examples for case study for selection materials. [7 hrs] 26- Material selection CES Edu Pack Tutorial Software. [7 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards,

	plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Apply CES Edu Pack Software tutorial. 5- Present group Project in the class.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	107	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction for selection of materials

Week 2	Selection process
Week 3	Cost basis for selection of materials
Week 4	Failure analysis
Week 5	Selection for mechanical properties (Strength of materials)
Week 6	Selection for mechanical properties (Stuffiness)
Week 7	Selection for mechanical properties (Toughness)
Week 8	Selection for mechanical properties (Corrosion)
Week 9	Selection for mechanical properties (Cost)
Week 10	Case study: Materials property charts
Week 11	Case study: The basics of materials selection
Week 12	Case study: Examples for case study for selection materials
Week 13	Material selection CES Edu Pack Tutorial Software
Week 14	Material selection CES Edu Pack Tutorial Software
Week 15	Presentation by student
Week 16	Presentation by student

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Apply CES Edu Pack Software for selection of materials
Week 2	Apply CES Edu Pack Software for selection of materials
Week 3	Apply CES Edu Pack Software for selection of materials
Week 4	Apply CES Edu Pack Software for selection of materials
Week 5	Apply CES Edu Pack Software for selection of materials
Week 6	Apply CES Edu Pack Software for selection of materials
Week 7	Apply CES Edu Pack Software for selection of materials

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	Materials Selection in Mechanical Design, Fourth Edition, Michael F. Ashby	Yes
Recommended Texts	1. Selection Engineering Materials, Kahtan K. Al-Khazraji and Osama S. Muhammed, University of Technology, Materials engineering department, Iraq 2. Selection and use of engineering materials, third edition, 3. Engineering materials properties and selection, Kenneth G. Budinski, Reston Publishing Company	yes
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**X-Ray Diffraction and Microscopy**	**Module Delivery**	
Module Type	**Core**	☐ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MAE482**		
ECTS Credits	**7**		
SWL (hr/sem)	**175**		

Module Level	41	**Semester of Delivery**	8
Administering Department	Dept. of engineering materials	**College**	College of engineering
Module Leader	Nuha Hadi Jasim	**e-mail**	Nuha.jasim@uobasrah.edu.iq
Module Leader's Acad. Title	Assist. Pro. Dr.	**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	The aim of studying the topics you mentioned, related to X-ray production, interference, diffraction, and electron microscopy, is to gain a comprehensive understanding of these techniques and their applications. By studying these topics, you aim to achieve the following: 1. X-ray Production: Understand the principles and mechanisms involved in X-ray production, including continuous X-ray production and characteristic X-ray production. 2. Interference and Diffraction: Explore the phenomenon of interference and diffraction of X-rays and understand their principles and applications in various fields. 3. Bragg's Law: Gain knowledge of Bragg's Law, which describes the diffraction of X-rays by crystals, and its applications in X-ray crystallography. 4. X-ray Absorption & Filtration: Understand the concepts of X-ray absorption and filtration, including their effects on X-ray imaging and material characterization. 5. Monochromatic X-ray: Study the production and application of monochromatic X-rays, which have a single wavelength or energy. 6. Diffraction Methods: Learn about different diffraction methods, including the Laue method, rotating crystal method, and powder method, and their applications in materials analysis. 7. Diffractometer, Spectrometer: Understand the principles and operation of X-ray diffractometers and spectrometers used for analyzing the diffraction patterns of materials. 8. Transmission Electron Microscope (TEM): Gain knowledge of TEM principles, construction, and operation, including sample preparation, lens defects, resolving power, depth of field, and depth of focus. 9. TEM Application: Explore the applications of TEM in studying the microstructure, composition, and defects of materials at the atomic level. 10. Scanning Electron Microscope (SEM): Understand the principles, construction, and operation of SEM, including its imaging capabilities and applications..
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The learning outcomes for studying the topics you mentioned, which include X-ray production, interference and diffraction, and electron microscopy, can include the following: Understanding of X-ray Production: Gain knowledge of the principles and mechanisms involved in X-ray production, including continuous X-ray and characteristic X-ray production. Mastery of Interference and Diffraction: Develop a thorough understanding of the phenomenon of interference and diffraction of X-rays, including the ability to apply the principles to analyze and interpret diffraction patterns.

	Application of Bragg's Law: Demonstrate knowledge and understanding of Bragg's Law and its application in X-ray crystallography and the determination of crystal structures. Knowledge of X-ray Absorption and Filtration: Understand the concepts of X-ray absorption and filtration and their effects on X-ray imaging and material characterization. Proficiency in Monochromatic X-ray Techniques: Acquire the skills to produce and work with monochromatic X-rays, which are essential for various applications, including high-resolution imaging and precise material analysis. Competence in Diffraction Methods: Develop the ability to apply different diffraction methods, such as the Laue method, rotating crystal method, and powder method, for the analysis of crystalline materials. Familiarity with Diffractometer and Spectrometer Operation: Gain practical experience in operating X-ray diffractometers and spectrometers, including sample preparation, data collection, and analysis. Understanding of Transmission Electron Microscopy (TEM): Gain knowledge of the principles, construction, and operation of TEM, including sample preparation techniques, imaging parameters, and analysis of TEM images and diffraction patterns. Application of TEM: Apply TEM techniques to study the microstructure, defects, and composition of materials at the atomic level, and understand their applications in materials characterization and research. Proficiency in Scanning Electron Microscopy (SEM): Develop skills in operating SEM instruments, including sample preparation, image acquisition, and elemental analysis using energy-dispersive X-ray spectroscopy (EDS). Application of SEM: Apply SEM techniques to investigate the surface morphology, topography, and elemental composition of materials, and understand their applications in various fields, including materials science, nanotechnology, and biological research.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. X-ray Production Interference and Diffraction **(4 Hours)** Braggs Law Continuous X-ray **(4 Hours)** Characteristic X-ray X-ray Absorption & Filtration Monochromatic X-ray **(4 Hours)** Diffraction Methods: Laue Method, Rotating Crystal Method, Powder Method

	(4 Hours) Diffractometer, Spectrometer Transmission Electron Microscope (TEM) , Sample Preparation , Lens Defects Resolving power, Depth of field, **(4 Hours)** Depth of focus , TEM Construction TEM Application, Scanning Electron Microscope (SEM) **(8 Hours)** ,SEM Construction , SEM Applications **(8 Hours)**

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	107	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	X-ray Production
Week 3	Interference and Diffraction
Week 4	Braggs Law
Week 5	Continuous X-ray
Week 6	Characteristic X-ray
Week 7	X-ray Absorption & Filtration
Week 8	Monochromatic X-ray
Week 9	Diffraction Methods: Laue Method, Rotating Crystal Method, Powder Method
Week 10	Diffractometer, Spectrometer
Week 11	Transmission Electron Microscope (TEM) ,
Week 12	Sample Preparation , Lens Defects
Week 13	Resolving power, Depth of field,
Week 14	Depth of focus , TEM Construction
Week 15	TEM Application, Scanning Electron Microscope (SEM)
Week 16	,SEM Construction , SEM Applications

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

Week 1	SEM sample preparation techniques
Week 2	TEM sample preparation techniques
Week 3	XRD sample preparation techniques
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lee, M. (2017). *X-Ray diffraction for materials research: from fundamentals to applications*. CRC Press.	Yes
Recommended Texts	Seeck, O. H., & Murphy, B. (Eds.). (2015). *X-ray Diffraction: Modern Experimental Techniques*. CRC Press.	No
Websites	https://www.nanoimages.com/sem-vs-tem/	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ADVANCED MATERIALS			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	MAE483				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	42		**Semester of Delivery**	8	
Administering Department	MAE		**College**	ENGINEERING	
Module Leader	Atheed Habeeb Taha		**e-mail**	Atheed.taha@uobasrah.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	1- Give the students important acknowledgments (theoretically and mathematically) about the physical properties of engineering materials. 2- Developing the student's acknowledgments on Nanomaterials. 3- Preparing the students and make them able to deal with the problems during their practical live after they graduated and solving the problems in industries. 4- Developing and improving scientific research in the fields of materials engineering and nanomaterials. 5- Improve the skills of the students to develop their knowledge and ability in the modern research field. 6- Develop the partnerships with the private or governmental sectors to help the community in different fields through the scientific activities.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An ability to apply knowledge of physical science for the engineering materials and Nanomaterials. 2. Solving different engineering problems. 3. Give the ability to conduct different experiments or tests depending on the data and field of acknowledgment. 4. Improving their skills, and modern engineering tools. 5. The ability to select the proper engineering materials for scientific and industrial applications. 6. Reading and writing a scientific reports. 7. Analyzing engineering materials problems.
Indicative Contents المحتويات الإرشادية	**-Electronic Materials** Ohm's Law and Electrical Conductivity Band Structures of Solids Conductivity of Metals and Alloys Superconductivity Conductivity in Other Materials Semiconductors Applications of Semiconductors Insulators and Dielectric Properties Polarization in Dielectrics Electrostriction, Piezoelectricity, Pyroelectricity, and Ferroelectricity **-Magnetic Materials** Classification of Magnetic Materials Magnetic Dipoles and Magnetic Moments Magnetization, Permeability, and the Magnetic Field Diamagnetic, Paramagnetic, Ferromagnetic, Ferrimagnetic, and Superparamagnetic Materials Domain Structure and the Hysteresis Loop The Curie Temperature Applications of Magnetic Materials Metallic and Ceramic Magnetic Materials **-Nanomaterial**

	1. Introduction the nanomaterial 2. Morphology of Nanomaterials 2.1. Zero dimensional nanostructures: nanoparticles 2.2. One-dimensional nanostructures: nanowires and nanorods 2.3. Two-dimensional nanostructures: thin films 3. Special nanomaterial's 3.1 Carbon fullerenes and nanotubes. Micro and mesoporous materials. Core-shell structures. 3.2 Organic-inorganic hybrids. Intercalation compounds. 3.3 Nanocomposites and nanograined materials. Inverse opals. Bio-induced nanomaterial. 4. Nanostructures fabricated 4.1 Top-down approaches 4.2 Bottom-up approaches 5. Characterization techniques for nanomaterial 5.1 Structural characterization. Chemical characterization. 5.2 Physical properties of nanomaterial 6. Applications of nanomaterials. **-Photonic Materials** -Photonic Materials The Electromagnetic Spectrum Refraction, Reflection, Absorption, and Transmission Selective Absorption, Transmission, or Reflection Examples and Use of Emission Phenomena Fiber Optic Communication System

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Explanation and clarification through lectures. 2. Using the scientific materials: data show, smart boards, plasma screens (if available). 3. Scientific Movies and videos. 4. Depending on the self-learning through homework and or seminars or groups discussions. 5. Short Projects. 6. Scientific visits. 7. Seminars. 8. Summer training. **-Assessment methods** 1- Short exams (Quiz). 2- Homework.

	3- Semester and final exams for theoretical and subjects. 4- Small projects within the lesson. 5- Activity and sharing during the lecture. 1. 6- Reports.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**-Electronic Materials** Introduction to electronic materials. Ohm’s Law and Electrical Conductivity

Week 2	Band Structures of Solids
Week 3	Conductivity of Metals and Alloys Superconductivity Conductivity in Other Materials
Week 4	Semiconductors Applications of Semiconductors
Week 5	Insulators and Dielectric Properties Polarization in Dielectrics Electrostriction, Piezoelectricity, Pyroelectricity, and Ferroelectricity.
Week 6	**-Magnetic Materials** -Introduction Classification of Magnetic Materials Magnetic Dipoles and Magnetic Moments Magnetization, Permeability, and the Magnetic Field
Week 7	Diamagnetic, Paramagnetic, Ferromagnetic, Ferrimagnetic, and Superparamagnetic Materials. Domain Structure and the Hysteresis Loop
Week 8	The Curie Temperature Applications of Magnetic Materials Metallic and Ceramic Magnetic Materials
Week 9 + Week 10	**-Nanomaterial** 1. Introduction the nanomaterial 2. Morphology of Nanomaterials 2.1. Zero dimensional nanostructures: nanoparticles 2.2. One-dimensional nanostructures: nanowires and nanorods 2.3. Two-dimensional nanostructures: thin films.
Week 11	3. Special nanomaterial's 3.1 Carbon fullerenes and nanotubes. Micro and mesoporous materials. Core-shell structures. 3.2 Organic-inorganic hybrids. Intercalation compounds. 3.3 Nanocomposites and nanograined materials. Inverse opals. Bio-induced nanomaterial.
Week 12 + Week 13	4. Nanostructures fabricated 4.1 Top-down approaches 4.2 Bottom-up approaches 5. Characterization techniques for nanomaterial 5.1 Structural characterization. Chemical characterization. 5.2 Physical properties of nanomaterial. 6. Applications of nanomaterials
Week 14 + Week 15	-Photonic Materials The Electromagnetic Spectrum Refraction, Reflection, Absorption, and Transmission Selective Absorption, Transmission, or Reflection Examples and Use of Emission Phenomena Fiber Optic Communication System
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	The Science and Engineering of materials/ Donald R. Askeland. 6th ed.	no
Recommended Texts	Introduction to MATERIALS SCIENCE FOR ENGINEERS. by James F. Shackelford 8th ed.	No
Websites	Any useful 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
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Project Management**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MAE484				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	43		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Lec. Assis. Sundus Khaleel Alfaiz		**e-mail**	Sondos.hussein@uobasrah.edu.iq	
Module Leader's Acad. Title	Lecturer Assistant		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	None		**e-mail**	E-mail	
Scientific Committee Approval Date	17/06/2023		**Version Number**	1.0	

3

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	Level 2 – 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	**Course Description**: Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project's requirements. Basic project management for engineering; project development and economic justification; estimating; scheduling; network methods; critical path analysis; earned value management; project organizational structures; project risk assessment; resource allocation; ethics; characteristics of project managers; decision making processes; quality management . **Objectives:** Develop the ability to identify, formulate, and solve problems of cost analysis in engineering decision making and the management and control of complex projects. Engineering project management topics include methods for planning, evaluation, organization, ethics, budgeting, cost estimating, scheduling, expediting, reporting, monitoring, and implementation of projects. Engineering economics topics including interest formulas and equivalence calculations, inflation, measures of investment worth, after tax analysis, depreciation accounting and replacement analyses, life cycle costing and design economics, risk analysis and cost-benefit analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Participants will be able to understand and implement simple tools and techniques of the main project management areas composed of: project integration management, project scope management, project time management, project costs management, and project risk management and industrial engineering. So that he has the ability to accomplish the following: - Understand the current state of the project management professional • Apply project management tools and techniques • Explore the appropriate methods to initiate, plan, execute, control and close projects • Perform economic calculations involving the Transportation technique using standard formulas and tables. • Compare alternatives via utilizing the decision theory, Game theory, Linear progress to get the most economical procedure. • Define and select a project and proper organizational structure to manage it. • Create a structured project plan that includes resource and cost analysis and manages risk. • Apply economic and project management knowledge to schedule resources, identify constraints, and track time in a project.

Indicative Contents المحتويات الإرشادية	This course will cover the basic tools, skills, and knowledge necessary to successfully manage a project through its inception, design, planning, construction, and transition phases. Students will learn a variety of tools and techniques to see what works and what does not in the real world of project management. The courses discuss the details of the processes required to manage timely completion of the project. It also includes the processes involved in estimating, budgeting and controlling costs so that the project can be completed within the approved budget. So that the vocabulary of the curriculum and the distribution of lecture hours will be as follows: - 1- General Introduction [4hrs] 2- Project Planning - Bar chart (Gantt Chart) [4hrs] 3- Project Planning Network Analysis Technique [4hrs] 4- Program Evaluation and Review Technique (PERT) [4hrs] 5- Resource Management (Levelling and Smoothing) [4hrs] 6- Estimation of Construction Cost [4hrs] 7- Reducing Project Duration by Crashing Management [4hrs] 8- Conflict and negotiation Management [4hrs] 9- Project Risk Management [4hrs] 10- Project Evaluation by Earned Value management [4hrs] 11- Linear Programming (Operation Research- Graphical & Simplex method) [4hr] 12- Material Management and Inventory Control [4hrs] 13- Transportation Problems[4hrs] 14- Decision theory & Game theory [4hrs] 15- Total quality management[4hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
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	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	General Introduction [4hrs]
Week 2	Project Planning - Bar chart (Gantt Chart) [4hrs]
Week 3	Project Planning Network Analysis Technique [4hrs]
Week 4	Program Evaluation and Review Technique (PERT) [4hrs]
Week 5	Resource Management (Levelling and Smoothing) [4hrs]
Week 6	Estimation of Construction Cost [4hrs]
Week 7	Reducing Project Duration by Crashing Management [4hrs]
Week 8	Conflict and Negotiation Management [4hrs]
Week 9	Project Risk Management [4hrs]
Week 10	Project Evaluation by Earned Value management [4hrs]
Week 11	Linear Programming (Operation Research- Graphical & Simplex method) [4hr]

Week 12	Material Management and Inventory Control [4hrs]
Week 13	Transportation Problems[4hrs]
Week 14	Decision theory & Game theory [4hrs]
Week 15	Total quality management[4hrs]
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Agilent VEE and PSPICE
Week 2	Lab 2: Thévenin's / Norton's Theorem and Kirchhoff's Laws
Week 3	Lab 3: First-Order Transient Responses
Week 4	Lab 4: Second-Order Transient Responses
Week 5	Lab 5: Frequency Response of RC Circuits
Week 6	Lab 6: Frequency Response of RLC Circuits
Week 7	Lab 7: Filters

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	إدارة المشاريع الإنشائية والعلاقات المهنية: احسان العطار	Yes
Recommended Texts	A Guide to the project management body of knowledge, 4th edition, PMI 2. Project Management, A Systems Approach to Planning, Scheduling, and Controlling, 10th edition, KERZNER 3. Principles of Construction management By: Roy Piltcher 4. Construction management By: Robert Hares & Frank Hares 5. Operations Management Creating Value Along the Supply Chain Russell - Chapter 9: Project management", By: Russell and Taylor (2011)	No
Websites	https://www.pmi.org/ https://www.pmi.org/pmbok-guide-standards/foundational/pmbok	

Grading Scheme مخطط الدرجات				
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			(%)	
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