Bologna Course Study Guide description form

University Name: Al-Furat Al-Awsat Technical University
the college : Polytechnic College Karbala
scientific department: Department of Mechanical Engineering Technology
Name of the academic or professional program: Mechanical techniques/production
Name of the final certificate: Technical Diploma + Bachelor's
School system: Bologna
Date the description was prepared: 25/12/2025
File filling date: 18 / 1 /2026

signature:
Head of Department Name:
Lec. Dr. Mohammad A. Naser
Date: 18/ 1 /2026

signature:
scientific Associate Name:
Assit. pro. Dr. Mohammed Fadhil Neamha Al-yassery
Date: 12-3-2026

Check the file before
Division of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department :

Signature: Assit. pro. Ali Neamah Hasan
Date: /1/2026

Ali Neamah Hasan.

Signature:
Approval of the Dean
Prof. Dr. Fadhil M. Dahir

Fadhil M. Dahir

Al-Furat Al-Awsat Technical University

Polytechnic collage - Karbala

(Program Catalogue)

2025-2026

First Cycle – Bachelor's Degree in Mechanical Technical Engineering / Production

بكالوريوس هندسة التقنيات الميكانيكية / الانتاج

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1. Mission & Vision Statement

Vision Statement

To achieve leadership and excellence in preparing highly qualified Mechanical Engineering Technology graduates who are scientifically and practically competent, capable of competing locally and internationally, and contributing to sustainable development and industrial transformation in accordance with the Bologna Process and academic quality standards.

Mission statement

The Department of Mechanical Engineering Technology is committed to providing high-quality technical engineering education based on the Bologna Process, integrating theoretical knowledge with practical applications, fostering engineering thinking, innovation, and applied research, while adhering to professional ethics, serving the community, and meeting labor market needs.

2. Program Specification

Programe Code	BSC-Mech, Eng.	**ETCS**	240
Duration	4 Levels, 8 Semester	**Method of Attendance**	Full Time

Mechanical Engineering Techniques of Production

The Mechanical Engineering Techniques of Production is a comprehensive academic program that focuses on applying fundamental engineering principles to the fields of power generation and thermal systems. While the specific syllabus may differ between universities, core subjects such as thermodynamics, fluid mechanics, internal combustion engines, and power system design remain consistent.

Program Components

The curriculum is designed to provide a well-rounded educational experience through a variety of practical and theoretical activities, including:

Group Projects:

Students collaborate on applied projects to enhance their teamwork and problem-solving skills.

Practical Training and Workshops:

The program offers hands-on experience through dedicated labs and workshops, ensuring students gain practical proficiency.

Internships and Industrial Visits:

Students gain a deeper understanding of real-world applications by participating in internships and visiting power plants and other industrial facilities.

Capstone Projects:

In their final year, students form teams to complete a capstone project that offers innovative solutions to complex engineering challenges within the field of mechanical power.

3. Program Objectives

1. To prepare graduates with technical competencies and practical skills aligned with the Bologna Process and labor market requirements.
2. To implement modern curricula based on learning outcomes and the credit hour system.
3. To enhance practical learning and industrial training and strengthen the link between academia and industry.
4. To develop students' analytical thinking, problem-solving abilities, and teamwork skills.
5. To support applied research and innovation in various mechanical technology fields.
6. To keep pace with technological advancement and digital transformation in engineering education.

7. To promote professional ethics, social responsibility, and environmental sustainability.
8. To strengthen cooperation with industrial and research institutions locally and internationally.
9. To continuously develop academic staff capabilities in line with quality assurance and accreditation standards.
10. To improve the quality of the educational process through continuous assessment and feedback

4. Student Learning Outcomes (SLOs)

A. Knowledge

By the end of the program, graduates will be able to:

SLO1. Explain the fundamental principles of mechanical engineering technologies, including mechanics, thermodynamics, fluid mechanics, and heat transfer.
SLO2. Describe the properties and behavior of engineering materials under mechanical and thermal loads.
SLO3. Explain manufacturing processes, machining operations, and mechanical production techniques.
SLO4. Describe the principles of mechanical system design and machine elements.
SLO5. Explain basic concepts of control systems, automation, and modern mechanical technologies.
SLO6. Explain occupational safety, sustainability, and environmental considerations in mechanical systems.

B. Skills

By the end of the program, graduates will be able to:

SLO7. Apply mathematical and engineering principles to solve mechanical engineering problems.
SLO8. Use engineering software and tools (e.g., CAD, CAE) for modeling and analysis of mechanical systems.
SLO9. Conduct laboratory experiments, analyze data, and interpret technical results.
SLO10. Design, analyze, and improve mechanical components and systems to meet specified

requirements.

SLO11. Identify mechanical faults and propose practical engineering solutions.

SLO12. Apply modern technologies, digital tools, and basic automation techniques in mechanical applications.

C. Professional Competences and Responsibility

By the end of the program, graduates will be able to:

SLO13. Work effectively as a member of multidisciplinary engineering teams.

SLO14. Communicate technical information clearly in written and oral forms.

SLO15. Demonstrate ethical responsibility, professional conduct, and commitment to safety standards.

SLO16. Manage time, tasks, and resources efficiently in engineering projects.

SLO17. Engage in lifelong learning and continuous professional development.

SLO18. Evaluate the economic, environmental, and societal impact of mechanical engineering solutions in line with sustainability principles.

5. Academic Staff:

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6. Credits, Grading and GPA

Credits:

- Al-Furat Al-Awsat Technology University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs student workload, including structured and unstructured workload.

- Grading Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows

Grading:

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRANDING SCHAME مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success Group (50-100)	A-Excellent	امتياز	90 - 100	Outstanding Performance
	B-Very Good	جيد جداً	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 with 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.				

The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

CGPA of a 4-year B.Sc. degree:

CGPA = [(1st module score x ECTS) + (2nd module score x ECTS) + ……] / 240

7. Curriculum / Module

Semester 1/ 30 ECTS / 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MTE111-22-PM	Engineering Mechanics (I) Statics	93	57	6	C	Non
MTE112-22-PM	Mathematics (I)	93	57	6	B	Non
MTE113-22-PM	Engineering Drawing	93	57	6	B	Non
MTE114-22-PM	Workshops (I)	93	57	6	C	Non
MTE115-22-PM	Engineering Material	63	37	4	S	Non
ATU10	English Language	33	17	2	S	Non

Semester 2/ 30ECTS / 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MTE121-22-PM	Engineering Mechanics (II)Dynamics	93	57	6	C	Non
MTE122-22-PM	Mathematics (II)	93	57	6	B	Non
ATU13	Human Rights and Democracy	33	17	2	S	Non
MTE123-22-PM	Fundamental of Electricity	63	37	4	B	Non
MTE124-22-PM	Manufacturing Processes (I)	93	57	6	C	Non
ATU12	Computer (I)	63	37	4	S	Non
ATU11	Arabic Language (I)	33	17	2	S	Non

Semester3/ 30 ECTS /1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MTE211-22-PM	Strength of Materials (I)	93	57	6	C	Non
MTE212-22-PM	Fundamental of Thermodynamics	63	37	4	C	Non
MTE213-22-PM	Manufacturing Processes (II)	93	57	6	C	Non
MTE214-22-PM	Workshops (II)	93	57	6	C	Non
MTE215-22-PM	Occupational Safety	48	52	4	B	Non
ATU 20	English Language (II)	33	17	2	S	Non
ATU22	Computer (II)	63	37	4	S	Non

Semester 4/ 30ECTS / 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MTE221-22-PM	Strength of Materials (II)	78	72	6	C	Non
MTE222-22-PM	Fluid Mechanics	63	37	4	B	Non
MTE223-22-PM	Mechanical Engineering Drawing	93	57	6	C	Non
MTE224-22-PM	Project (I)	63	37	4	C	Non
ATU 24	Crimes of the Baath Regime in Iraq	33	17	2	S	Non
MTE225-22-PM	Principle of Engineering Metallurgy	78	72	6	C	Non

ATU 21	Arabic Language(II)	33	17	2	S	Non

Semester 5/ 30ECTS / 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MTE311-22-PM	Theory of Machines	93	57	6.	C	Non
MTE312-22-PM	Mathematics (III)	63	87	6.	B	Non
MTE313-22-PM	Technology of materials	63	87	6.	C	Non
MTE314-22-PM	Professional Ethics	33	17	2.	S	Non
MTE315-22-PM	Principles of Production Engineering	78	47	5.	C	Non
MTE316-22-PM	Computer Applications (I)	48	27	3.	B	Non
MTE317-22-PM	English for Academic	33	17	2.	S	Non

Semester 6/ 30ECTS / 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MTE321-22-PM	Workshops (III) - CNC	93	57	6	C	Non
MTE322-22-PM	Hydraulic and Turbomachinery systems	63	62	5	B	Non
MTE323-22-PM	Numerical and Engineering Analyses	63	62	5	B	Non
MTE324-22-PM	Engineering Materials Inspections	78	72	6	C	Non
MTE325-22-PM	Heat Transfer	63	87	6	B	Non
MTE326-22-PM	Research Methodology Scientific	33	17	2	S	Non

Semester 7/ 30ECTS / 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MTE411-22-PM	Mechanical Design	78	72	6	C	Non
MTE412-22-PM	Control and Measurement Systems	63	62	5	C	Non
MTE413-22-PM	Engineering Nano materials and Technologies	63	62	5	B	Non
MTE414-22-PM	Industrial Engineering	63	62	5	C	Non
MTE415-22-PM	Systems Modeling and Simulation	78	47	5	C	Non
MTE416-22-PM	Graduation Project	63	37	4	C	Non

Semester 8 / 30ECTS / 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MTE421-22-PM	Vibration Theory	78	47	5	C	Non
MTE422-22-PM	Maintenance	48	77	5	B	Non
MTE423-22-PM	Computer Applications (II)	48	27	3	S	Non
MTE424-22-PM	Composite materials	48	52	4	C	Non
MTE425-22-PM	Computer Aided Design	78	47	5	B	Non

MTE426-22-PM	Graduation Project(continue)	63	37	4	C	Non

8. Contact

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mechanics - Statics**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MTE111-22-PM				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	1	
Administering Department	MTEK		**College**	ATU22	
Module Leader	Hussein Mohammed Sadeq		**e-mail**	hussein.sadeq@atu.edu.iq	
Module Leader's Acad. Title	Assist. Lec.		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Hussein Mohammed Sadeq		**e-mail**	hussein.sadeq@atu.edu.iq	
Peer Reviewer Name	None		**e-mail**		
Scientific Committee Approval Date	12/10/2025		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics (I)	**Semester**	1st
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Introduce students to the fundamental concepts of engineering mechanics, including units, scalar and vector quantities. 2. Develop the ability to analyze and resolve forces, determine resultants, and apply laws of vector addition. 3. Enable students to apply scalar and vector methods to analyze coplanar force systems and particle equilibrium. 4. Provide knowledge of moments, couples, and the conditions for equilibrium of rigid bodies under different loading cases. 5. Familiarize students with the concepts of distributed loads, centroid, first moment of area, and their applications in structural analysis
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**By the end of this module, students will be able to:** 1. Understand the basic principles of statics, perform unit conversions, and distinguish between scalar and vector quantities. 2. Analyze and determine the resultant of forces using graphical and vector methods. 3. Apply scalar and vector approaches to solve problems involving coplanar force systems. 4. Formulate and solve equilibrium equations for a particle under concurrent forces. 5. Calculate the moment of a force about a point or an axis. 6. Understand and analyze the effect of couples acting on rigid bodies. 7. Apply equilibrium conditions to rigid bodies subjected to force systems. 8. Represent distributed loads and reduce them to equivalent concentrated forces and moments. 9. Analyze problems involving static friction in engineering systems. 10. Determine the centroid and first moment of area of common geometrical shapes.
Indicative Contents المحتويات الإرشادية	1. Introduction & Fundamental Concepts – Basic principles of mechanics, units' conversion, scalar and vector quantities. 2. Force Systems – Resultant forces, resolution and composition of forces, triangle and parallelogram laws. 3. Addition of Coplanar Forces – Using scalar notation and Cartesian vector notation for multiple forces. 4. Equilibrium – Conditions for equilibrium 5. Moments & Couples – Moment of a force, principle of moments and moment of a couple. 6. Equilibrium of Rigid Bodies – Static equilibrium in two dimensions. 7. Distributed Loads – Analysis and resultant of distributed forces. 8. Friction – Static and kinetic friction, limiting equilibrium, and applications. 9. Centroid & First Moment of Area – Centroid of simple and composite areas, first moment of area. 10. Area Moment of Inertia – Second moment of area for rectangles, triangles, circles, and composite shapes, and applications in structural analysis.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module focuses on actively engaging students in exercises while simultaneously developing and enhancing their critical thinking skills. This will be accomplished through lectures, interactive tutorials, and simple experimental activities, including sampling exercises designed to capture students' interest and promote hands-on learning.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Fundamental Concepts, Units Conversion, Scalar and Vector Quantities.
Week 2	Resultant force Resolution
Week 3	The resultant of several converging
Week 4	Composition of Forces.
Week 5	Addition of a System of Coplanar Forces
Week 6	Scalar Notation, Cartesian Vector Notation
Week 7	Equilibrium of a Particle
Week 8	Equilibrium of a Particle
Week 9	Moment of a Force
Week 10	Moment of a Couple
Week 11	Equilibrium of a Rigid Body
Week 12	Distributed loads.
Week 13	Friction
Week 14	Centroid, Centroid of area, First moment of area.
Week 15	Area moment of inertia, Second moment of area.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Conversion units of scalar, vector and Problem solving
Week 2	Force resolution, find resultant of 2d by graphical method
Week 3	Find resultant of 2d by graphical method
Week 4	Equilibrium test, types of supporting, Conditions of equilibrium
Week 5	Moments and their application
Week 6	Friction tests, Applications of Friction tests
Week 7	Find the centroid of different shapes, Center of gravity for regular and irregular bodies

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Mechanics/ Statics, by R.C. Hibbeler, Engineering Mechanics Stats Abdel Karim M.B.AL - Shamaa	Yes
Recommended Texts	Engineering Mechanics, Ferdinand L. Singer, 2-Engineering Mechanics, Meriam 3- Static Hibler Engineering Mechanics 4- Engineering Mechanics Miriam 5- Hepler materials 6- Nelson engineering mechanics	No
Websites	https://www.youtube.com/watch?v=XbCdh7h-Nx0 https://www.youtube.com/watch?v=gZF2wdhj https://www.youtube.com/watch?v=Ug818THEVE0 https://www.youtube.com/watch?v=XkQM3z3	

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 (I)**			**Module Delivery**	
Module Type	B			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	MTE112-22-PM				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	1	
Administering Department	MTEK		**College**	ATU22	
Module Leader	Laith Haider Hamid Sara Muhi Jawad		**e-mail**	laith.hamid.ikr14@atu.edu.iq sarah.jawad.ikr@atu.edu.iq	
Module Leader's Acad. Title	Assist. Lec.		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Zahraa Saad Hamzah		**e-mail**	zahraa.hamzah.ikr@atu.edu.iq	
Peer Reviewer Name	None		**e-mail**		
Scientific Committee Approval Date	12/10/2025		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To introduce the student to the basic and advanced principles of calculus and integrations and its various applications 2. To develop his mental abilities when solving exercises. 3. Linking data with information to reach a solution to issues and benefit from them in other subjects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define the determinants and be able to solution of linear equation 2. Recognize trigonometric functions and some applications. 3. Summarize what is meant by a scalar and vector product and projections. 4. Discuss the Limit and continuity. 5. Describe derivative theory. 6. Define Chain rule. 7. Identify the inverse function and its derivative. 8. Discuss Derivative of logarithmic and hyperbolic functions. 9. Discuss the definite and indefinite integral. 10. Explain the Retail integration. 11. Identify the Integration by completing the square. 12. Discuss the approximate area using the trapezoidal rule and Simpsons.
Indicative Contents المحتويات الإرشادية	

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	15% (15)	5 and 10	LO #1, #2 and #10, #11
	Assignments	4	15% (15)	2 ,5,9, 12	LO #3, #4 , --, #11
	Projects / Lab.	0	0%		
	Report	1	10% (10)	13	LO #5, #8,#9 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Determinants and solution of linear equation by Gramer's rule
Week 2	Trigonometric functions and some applications
Week 3	Vectors, scalar and vector product and projections, mechanical applications to vectors
Week 4	Limit and continuity, and some applications
Week 5	Derivative theory, derivatives of algebraic and implicit functions
Week 6	Chain rule, mechanical applications on the derivative
Week 7	The inverse function and its derivative
Week 8	Derivative of logarithmic and hyperbolic functions
Week 9	Integration, definite and indefinite integral, integration of trigonometric and logarithmic functions
Week 10	Retail integration
Week 11	Integration by division of fractions
Week 12	Integration by trigonometric function method
Week 13	Integration by completing the square
Week 14	Simplified differential equations
Week 15	Approximate area using the trapezoidal rule and Simpsons
Week 16	Final Exam

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus, R. Mohammed and A. Abdulaali, 2002	
Recommended Texts	Advanced calculus, Murray R. Splegel, 1962	
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	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MTE113-22-PM				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	1	
Administering Department	MTEK		**College**	ATU22	
Module Leader	Sattar Jabbar Mettib		**e-mail**	sattar.mettib@atu.edu.iq	
Module Leader's Acad. Title	Assist. Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	None		**e-mail**		
Peer Reviewer Name	None		**e-mail**		
Scientific Committee Approval Date	12/10/2025		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To introduce students to the fundamentals of engineering drawing as the universal language of engineers and designers. 2. To enable students to interpret and produce mechanical drawings in accordance with international standards (ISO, ASME). 3. To develop skills in creating accurate 2D and basic 3D mechanical drawings using AutoCAD. 4. To link engineering drawing with real mechanical components and manufacturing processes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	LO1: Identify and apply the standards and conventions of mechanical engineering drawing (lines, symbols, scales, title blocks). LO2: Produce orthographic views (front, top, side) for mechanical parts and assemblies. LO3: Apply sectional views (full, half, broken) to reveal internal features clearly. LO4: Use correct dimensioning and tolerancing systems (linear, angular, radial, GD&T basics). LO5: Create isometric/pictorial drawings and demonstrate 3D visualization from 2D projections. LO6: Utilize AutoCAD to design, edit, annotate, and print engineering drawings with appropriate layouts and scales. LO7: Relate drawings to manufacturing processes and assembly documentation.
Indicative Contents المحتويات الإرشادية	Foundations of engineering graphics; ISO/ASME standards; orthographic projection; sectional views; dimensioning & tolerances; isometric and pictorial drawing; AutoCAD environment and commands (draw, modify, annotate); layouts, scales, title blocks; introduction to assembly and exploded views; printing/plotting practices.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Theoretical lectures to explain engineering drawing principles. Hands-on practical sessions in the computer lab using AutoCAD to apply the concepts. Short in-class exercises and guided assignments to reinforce skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to engineering drawing & standards; types of lines; scales; lettering; AutoCAD interface.
Week 2	Explanation of AutoCAD drawing commands; using the drawing commands from the Draw toolbar; explanation of the Line command; and providing a drawing exercise after each lecture.
Week 3	Coordinate systems (absolute, relative, polar); geometrical constructions.
Week 4	Modify commands (Move, Copy, Mirror, Offset, Trim, Extend).
Week 5	Explanation of engineering processes. Drawing an application diagram. About engineering processes.
Week 6	Continuing the explanation of geometric operations and types of lines. Draw one or more geometric designs illustrating different types of lines.
Week 7	Explanation of the commands for drawing arrays, polygons, and ellipses from the drawing tools toolbar. Also, in This section explains the "Modify" toolbar and covers the commands for moving, rotating, and copying objects.
Week 8	Draw one or more technical drawings related to the previous topics.
Week 9	Explain the concept of projection and how to draw three-dimensional projections; also, create a diagram illustrating this concept.
Week 10	Continuing the explanation: How to find the three main geometric projections (front, side, and top views) and how to draw a technical drawing.
Week 11	Sectional views: full, half, broken; hatching conventions. Practice on sectional drawings of

	mechanical components.
Week 12	How to add dimensions to technical drawings and Explain the method for deriving the third projection view when two projection views are known, and draw a technical drawing illustrating this concept.
Week 13	Isometric and pictorial drawings – principles and examples.
Week 14	Exercises in isometric projection and 3D visualization from 2D.
Week 15	Project presentations; comprehensive review before final exam.
Week 16	Final Exam

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Required Texts: - Abdul Rasool A. Al-Khuffaf, Engineering Drawing, Dar Al-Kutub, Iraq, 1990. - Giesecke, F.E. et al., Technical Drawing with Engineering Graphics, 15th Ed., Pearson, 2018. - Bob McFarlane, Beginning AutoCAD 2023: A Modern Guide for Engineers, Elsevier, 2023.	
Recommended Texts	- Autodesk Education: education.autodesk.com - AutoCAD Mechanical basics (YouTube learning resources)	
Websites	https://www.scribd.com/document/370481058/%D9%83%D8%AA%D8%A7%D8%A8-%D8%A7%D9%84%D8%B1%D8%B3%D9%85	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Workshops I**			**Module Delivery**	
Module Type	**C**			☐ **Theory** ☐**Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐**Seminar**	
Module Code	**MTE114-22-PM**				
ECTS Credits	150				
SWL (hr/sem)					
Module Level	1		**Semester of Delivery**	1	
Administering Department	ATU		**College**	PMTE	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	nadham amwell hailbas		**e-mail**	nadham.hailbas@atu.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	12/10/2025		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	……	**Semester**	1st
Co-requisites module	-----	**Semester**	-----

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	To equip students with the fundamental concepts of engineering workshop operations. • To train students in the correct and safe use of manual and mechanical tools and equipment. • To develop practical skills in carpentry, plumbing, metalworking, welding, and lathe operations. • To promote occupational safety awareness during the execution of various operations. • To bridge the gap between theory and practice in producing engineering parts that meet specifications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, the student will be able to: • Understand the basic principles of engineering workshop operations and their applications in industrial settings. • Be familiar with manual and mechanical tools and equipment, and how to operate and maintain them. • Accurately and safely perform practical exercises in carpentry, plumbing, welding, metalworking, turning, and sheet metal work. • Apply occupational safety standards while working in workshops and handling various equipment. • Analyze manufacturing defects and errors and propose appropriate solutions to correct them and improve product quality.
Indicative Contents المحتويات الإرشادية	• Definition and types of wood and their uses. • Types of models and methods of manufacturing and correcting them. • Hand tools and mechanical equipment used. • Practical exercises in making simple and complex models. Metalworking and Blacksmithing • Tools and equipment for cutting, bending, and shaping metals. • Drawing and drawing processes and practical exercises (cylinders, cones).

	• Use of machines such as rolling and grooving machines. Metal Casting • Principles of casting and its importance in industry. • Sand molds and methods of shaping them. • Melting metals, the casting process, and extracting and cleaning castings. • Types of melting furnaces and how to operate them. Filing and Maintenance • Measuring tools (caliper, compass) and how to use them. • Files, saws, drilling and threading operations. • Practical exercises in filing and metalworking. • Concepts of periodic and preventive maintenance, maintenance reports. Welding • Safety precautions. • Gas welding: equipment and auxiliary materials. • Electric arc welding and MIG/TIG and CO_2 processes. Electric arc welding and its practical applications. • Practical training on welding various joints. Turning • The lathe and its basic components. • Types of lathe tools and their uses. • Basic turning operations (leveling, straightening, centering). • Eccentric turning and external threads, selecting cutting speeds.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This course is distinguished by its comprehensiveness and diversity, covering a

	wide range of essential workshop operations such as carpentry, sheet metal work, plumbing, metalworking, welding, and turning, thus providing students with a solid theoretical and practical foundation in manufacturing techniques. The course is characterized by its integration of theoretical and practical aspects through hands-on workshop training, which helps students develop essential technical skills required in the industrial field. Furthermore, the course enhances students' awareness of the importance of occupational safety through consistent adherence to industrial safety regulations and prepares them for advanced courses in engineering disciplines. In addition, it contributes to developing their ability to analyze industrial problems and troubleshoot defects, connecting them to the realities of industry through practical applications that simulate the requirements of actual factories.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**				
	Assignments				
	Projects / Lab.	15	60%(60)	1-15	LO:ALL

	Report	5	10%(10)	3,6,9,12,15	LO #All
Summative assessment	**Midterm Exam**				
	Final Exam	3 hr	20% (20)	16	LO #All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	1. Pattern Making ● Basic principles of pattern making, definition of wood types and their uses, types of patterns, their carpentry, and their applications in plumbing. ● Pattern correction, conditions that must be met in pattern correction, shrinkage factor, practice on working drawings of simple patterns with a single boundary and without a box. ● Equipment used, including hand tools and mechanical equipment: thicknesser, circular saw, band saw, planer, sander, and converter. ● Practical training in chamfering parts according to the working drawing and markings.
Week 2	● Completion of training, finishing of model parts, assembly methods, and final dimensions. ● Composite models: Explanation of multiple boundary lines and internal spaces. 1. Sheet metal and blacksmithing • Billet cutting equipment, bending, rolling mill, grooving machine and hand tools, manual billet bending and shaping, standard mortise and tenon joints, drawing methods, simple single-piece workpieces, and calculating the single-piece workpieces of cut and missing workpieces.
Week 3	● Practice calculating the odds and odds of intersecting workpieces; work on an exercise involving two intersecting cylinders.

	● Odds and odds of a cone and a truncated cone.
Week 4	3. Metal Casting ● Metal casting and its importance; the purpose of using castings in industry; the contents of the casting unit; industrial safety precautions in casting; creating a sand mold of a one-piece model in front of the students; mold sand and cores, their types and sources, the properties of additives, mixing processes, and proportioning; using a sand mixer; sand treatment. ● Creating sand molds manually for a one-piece model. ● A sand mold of a one-piece model with the identification of the outlets and risers; melting and pouring metals into a mold; extracting and cleaning the castings.
Week 5	• Forming a sand mold as before, melting the metal, pouring it into the mold, removing the casting, and cleaning it. • Production-scale sand casting; training on using casting plates containing multiple pieces in a single mold and with cores; methods of cleaning castings using brushes, files, grinding stones, steel balls, compressed air, and rotary machines; reviewing and inspecting castings; identifying visible defects and their causes; checking casting dimensions; and ensuring they conform to the required dimensions.
Week 6	●Sand casting of models and composites with a core; these exercises are among those the student will complete in other laboratories. ● Metal melting furnaces: their types, characteristics, uses, rotary furnace, stirrer, and stationary furnace.
Week 7	4. Filing and Maintenance ● Industrial development and the role of filing within it ● Vernier calipers: types, methods of measurement, how to operate a vernier caliper that reads depth and height measurements, and calipers ● Files and the filing process: types of files and their specifications, workpiece clamps and their types, and methods of workpiece clamping and operation

	● Uses of files, how to clean files, the filing process, and a practice in basic filing and sanding. ● Saw cutting: hand saw, saw blade, saw blade mounting ● Requirements for sawing, and a practice in saw cutting.
Week 8	● Chiseling: Types of chisels, chisel teeth and maintenance, types of hand hammer heads, hammer head mounting techniques, chiseling practice. ● Drilling and Bolting: Types of drill bits, primers, rimmers, how to perform drilling and bolting, manual and mechanical drilling and bolting practice after machining operations. ● Threading: Types of threads, internal and external thread tables, practice performing various threading operations. ● Various drills on the previously mentioned machining operations.
Week 9	● The importance of maintenance for machinery and equipment, explaining routine and comprehensive maintenance procedures, and how to prepare maintenance reports. ● Types of gaskets and seals, their uses, installation and removal methods, and how to check their functionality. ● Types of valves, their operation, inspection, and repair.
Week 10	5. Welding ● Occupational safety and security precautions; gas welding; equipment used and its installation and adjustment; other auxiliary tools and gases used and their specifications; welding wires, their types and sizes; other auxiliary materials; welding equipment; types of flames and how to ignite and adjust the required flame; rinsing workpieces and cleaning edges to be welded.

	● Practical exercises: Welding opposite surfaces, perpendicular surfaces, inclined surfaces, circular welding, longitudinal and transverse cutting.
Week 11	• Welding equipment: Practical training on using electric arcs to weld various surfaces, including equipment, electrodes and their installation. • CO2 welding and gas cutting processes: Equipment used and necessary precautions. • Welding exercises using CO2 gas.
Week 12	● Training in gas-shielded arc welding (TIG, MIG) ● Combination exercises using various cutting and welding processes.
Week 13	6. Lathe Operation ● The lathe: its specifications, uses, accessories, and installation methods; lathe operation; types of lathe tools and their uses. ● Lathe operations: plane turning, straight turning, center turning, performing a simple step turning, using measuring tools.
Week 14	● Turning the external tapered tooth using different methods, explaining the rules specific to each method, and completing an exercise on the external tapered tooth. ● Machining different external teeth (triangular), including an exercise involving a triangular tooth. ● Machining an external square tooth and completing an exercise.
Week 15	●Cutting speeds, their selection, and the use of their tables. ● Implementing training on eccentric turning and the use of the four-way sample.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Workshop Technology – Authors: Abdul Rahman Mujahid et al.	

	– University Book House. Production Workshop Curricula – Published by technical universities and industrial institutes in Iraq, Egypt, and Saudi Arabia (Production Workshop/Mechanical Courses). Metal Casting and Workshop Technology – Engineering Technical College Courses	
Recommended Texts	Mujahid, A. (2005). Workshop Technology. Cairo: University Book House. Ministry of Higher Education and Scientific Research, Production Workshop Curricula. Baghdad, 2018. Ministry of Higher Education and Scientific Research. (2018). Production Workshop Curricula for Mechanical Engineering Students. Baghdad: Middle Technical University. Ministry of Higher Education and Scientific Research (Iraq/Egypt/Saudi Arabia). Production Workshop Curricula. Hijazi, Ali. (2010). Fundamentals of Welding and its Applications. University Knowledge House.	
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	**Engineering Materials**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	MTE115-22-PM				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		1	**Semester of Delivery**		1
Administering Department		MTEK	**College**	ATU22	
Module Leader	Mahir Hameed Majeed Zainab Abdulraheem abdulhasan		**e-mail**	dr.mahir@atu.edu.iq ZainabAbdulraheem @atu.edu.iq	
Module Leader's Acad. Title		Prof Lec.	**Module Leader's Qualification**		PhD PhD
Module Tutor	None		**e-mail**		
Peer Reviewer Name		None	**e-mail**		
Scientific Committee Approval Date		12/10/2025	**Version Number**		1

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module	Manufacturing Processes and Strength of Materials	**Semester**	3 4

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. This course aims to provide students with fundamental knowledge of the atomic and crystal structures of materials and their relation to engineering properties. It also enables students to understand the classification of major materials, including metals, polymers, ceramics, glass, composite, and nanomaterials. 2. The course seeks to clarify the principles of thermal equilibrium, mechanical properties, and testing methods, with an emphasis on industrial applications. It further focuses on studying traditional materials such as steels, cast irons, plastics, ceramics, and glass in terms of structure, properties, and uses. 3. Overall, the course aims to develop the students' ability to select the most appropriate materials for various engineering applications according to design requirements
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course, the student is expected to be able to: 1. **Knowledge & Understanding:** • Explain the atomic and crystal structures of materials and their relation to engineering properties. • Distinguish between primary and secondary chemical bonds and their influence on material properties. • Describe the concepts of thermal equilibrium diagrams and apply them to alloys such as the iron–carbon system. • Recognize the classification of engineering materials: metals, polymers, ceramics, glass, composites, and nanomaterials. 2. **Cognitive Skills:** • Analyze the relationship between microstructure and mechanical properties of materials. • Interpret the results of mechanical testing and relate them to industrial applications. • Compare steels, cast irons, plastics, ceramics, and glass in terms of structure, properties, and applications. 3. **Practical & Applied Skills:** • Apply theoretical principles to solve problems related to manufacturing and mechanical properties of materials. • Utilize acquired knowledge to evaluate the use of traditional and advanced materials (such as nanomaterials and composites) in industrial applications
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** **Part A - Engineering materials:**

	-Introduction to ores, elements and materials {Iron ores, Periodic table of elements, Engineering materials}., **Classification of engineering materials** **-Crystal structure**: atomic arrangement {BCC, FCC and HCP structures}, Atomic packing factor. **-Imperfections in crystals**: {Point defects, Dislocations and grain boundaries}, Solidification of metals and alloys **- Structure of ingots chilled** {Columnar and central equi-axed grains, Dendritic segregation.} [8 hrs], **Part B - Thermal equilibrium diagrams** -Solubility in the solid state, Phases, Solid solutions, compounds and mechanical mixtures. -**Lever rule**: {Eutectic, Eutectoid and Peritectic reactions}., **Applications on binary phase diagrams**, Components completely soluble, completely insoluble or partially soluble in the solid state. [5hrs] **Part C – Mechanical properties of metals:** - Specifications and standards, Normal stress and shear stress, Strain, Tensile and compression tests, Stress-strain diagram. **-Application on mechanical testing and properties,** Determination of Young's modulus, Yield stress, Proof stress, Ultimate tensile strength, Fracture stress, ductility - Hardness and impact toughness [4 hrs] **Part D – Iron and Steel:** - Fe-Fe3C phase diagram, Allotropy, Microstructure of carbon steels, Effect of carbon content on microstructure & mechanical properties of carbon steel. **Carbon steel** -Types, Properties and uses of carbon steel, Low, medium, and high carbon steel, Tool carbon steel. **-Cast Iron** Types, properties and uses of cast iron White, grey, nodular and malleable cast iron. [4 hrs]. **Part E– Non- destructive inspection:** - Liquid penetrant, Magnetic particle, X-rays, Ultrasonic. [2 hrs] **Part F–Materials** **-Nano materials**, Characterization of nano particles and nano structures, Classification, Applications of nano materials in technology and medicine. **-Plastics**, Introduction to plastics technology, Microstructure and polymerization , Structure of plastics materials., Classification, properties and uses of plastics. - **Ceramics and glass**, Structure, defects, properties and uses of ceramics., Structure, properties and uses of glasses. **-Composite Materials**, Classification: metal matrix, ceramic matrix and polymer matrix composites, Reinforcing phase: fibers, flakes, and particles. Composite's structure and volume fraction, Properties and uses of composites [7 hrs]

Learning and Teaching Strategies **استراتيجيات التعلم والتعليم**	
Strategies	The learning and teaching strategy is designed to: Carefully cover in lectures the

	necessary fundamental material and analytical techniques. Presenting the fundamental concepts related to the atomic and crystalline structure of materials, as well as the mechanical, thermal, and electrical properties of materials. Using practical examples linked to technical disciplines to enhance students' understanding. Assigning students short presentations or research projects on engineering materials used in industry (such as metals, ceramics, and polymers). Discussing case studies from real industrial applications.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	15% (15)	2, 5	LO #1
	Assignments	2	15% (15)	8,13	LO #2 and #3
	Projects / Lab.	--	---	---	---
	Report	2	10% (10)	6, 13	LO #1, 2, 3
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 and #2
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to engineering materials science:** History of materials, what is material science and engineering?
Week 2	Classification of engineering materials Atomic structure. Electronic structure. The periodic table
Week 3	Crystal structure - BCC -FCC and HCP structures - Atomic packing factor.
Week 4	Imperfections in crystals -Point defects -Dislocations and grain boundaries -Solidification of metals and alloys
Week 5	Atomic Scale, Bonding in Molecules, -primary bond: Ionic bond -Covalent bond -Metallic bond Secondary interatomic bond.
Week 6	Thermal equilibrium diagrams - Solubility in the solid state - Phases - Solid solutions, compounds and mechanical mixtures
Week 7	Equilibrium diagram: Solids solutions and alloys, Gibbs phase rule, Unary and binary eutectic phase diagram, Examples and applications of phase diagrams like Iron - Iron carbide phase diagram.
Week 8	Mechanical properties of metals.
Week 9	Application on mechanical testing and properties.
Week 10	carbon exist as diamond, graphite, and amorphous carbon
Week 11	Carbon steel - Types, Properties and uses of carbon steel - Low, medium, and high carbon steel - Tool carbon steel. Cast Iron - Types, properties and uses of cast iron -White, grey, nodular and malleable cast iron
Week 12	Plastics - Introduction to plastics technology - Microstructure and polymerization

	- Structure of plastics materials. - Classification, properties and uses of plastics.
Week 13	Ceramics and glass - Structure, defects, properties and uses of ceramics. - Structure, properties and uses of glasses.
Week 14	Nano materials -Characterization of Nano particles and Nano structures -Classification -Applications of Nano materials in technology and medicine.
Week 15	Composite Materials -Classification: metal matrix, ceramic matrix and polymer matrix composites -Reinforcing phase: fibers, flakes, and particles. -Composites structure and volume fraction -Properties and uses of composites
Week 16	Final Exam

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	EIGHTHEDITION Materials Science and Engineering An Introduction [William D. Callister, Jr. and David G. Rethwisch] -Callister, William D.; Rethwisch, David G.Fundamentals of Materials Science and Engineering : an integrated approach 5. edition,	

	International student version: Hoboken, N.J.: iley, 2016 -Williams D Callister, “Material Science and Engineering” Wiley India Pvt Ltd, Revised Indian, Edition 2014 - The Science and Engineering of Materials, Donald R. Askeland .	
Recommended Texts	1. U.C.Jindal : Material Science and Metallurgy, "Engineering Materials and Metallurgy", First Edition, Dorling Kindersley, 2012 2. Raghavan. V, “Materials Science and Engineering”, Prentice Hall of India Pvt. Ltd.. 2015. 3. Groover, Mikell P. Fundamentals of modern manufacturing: materials, processes, and systems. John Wiley & Sons. 4. Essentials of Materials Science and Engineering Second Edition, SI	
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	**English Language I**			**Module Delivery**	
Module Type	S			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	ATU10				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	**Semester of Delivery**		1
Administering Department		MTEK	**College**	ATU22	
Module Leader	Khaleel Abdul Hur Ali		**e-mail**	khaleel.eng@atu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**	E-mail	
Peer Reviewer Name		None	**e-mail**		
Scientific Committee Approval Date		12/10/2025	**Version Number**		1

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	- To develop problem solving skills mainly speaking, reading, writing and listening skills and to understand the English language as a foreign language through the application of many techniques. -To understand the general principles of the English language. -This course deals with the basic concepts of learning the main rules of English grammar and English vocabularies. - This is the basic subject for writing and speaking English well. -To understand how to build a correct English sentence.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- To recognize how to use the main and auxiliary verbs in addition to the possessive pronouns. 2- To list the various words associated with questions and many subject pronouns. 3- To talk about social expressions and personal information mainly about jobs by using affirmative, negative and interrogative sentences. 4- To discuss how to use adjectives and their positions in the sentence. 5- To construct the simple present sentence by using I/ we/ you and they and to define the articles. 6- To describe the present simple tense with using he/ she and to discuss adverbs of frequency. 7- To identify the basic question words and demonstrative pronouns and their applications. 8- To discuss the use of there is/ are and many prepositions. 9- To discuss the structure of simple past sentences and various irregular verbs. 10- To explain the negative and interrogative structure of the simple past tense sentence in addition to the adverbs of the past tense. 11- To identify the use of many adverbs and the use of can/ can't in the sentence and to explain requests and offers. 12- To elaborate the use of like and would you like and the use of some and any in many expressions. 13- To discuss the use of the present continuous and the difference between present simple and present continuous sentences. 14- To explain the structures that are used to refer to future plants.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in this module is associated with the communicative approach which will be applied to develop students' skills to learn English and to enable students to use English in communication, therefore, using authentic materials in the class is so necessary. This approach is important to encourage students' participation in the class and to highlight their motivation in learning English, while at the same time refining and expanding their interactions and skills to achieve at least more success.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	4,11 and 13	LO :3, 10 and 12, 13, 14
	Assignments	2	15% (15)	6 and 12	LO : 5, and 11
	Projects / Lab.	-			
	Report	2	10% (10)	7, 13	LO :5, 8 and 9 ,10
	seminar			10	All
Summative assessment	**Midterm Exam**	1hr	10% (10)	7	LO : l - 7
	Final Exam	2hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Unit one: Hello Am/are/is. May/your This is with practice in work

Week 2	Unit two: Your world He/she/they, his/her Questions
Week 3	Unit three: All about you Personal information/ social expressions
Week 4	Unit four: Family and friends Possessive adjectives/ possessive 's Have/has , adjective + noun
Week 5	Unit five: The way I live Present simple |/we/you/they An/a , adjective + noun
Week 6	Unit six: Every day Present simple he/she Negatives and questions. adverbs of frequency
Week 7	Unit seven: My favorites Question words, pronouns, this/that
Week 8	Unit eight: Where | live There is/ are, prepositions
Week 9	Unit nine: Times past Was/ were born, past simple and irregular verbs
Week 10	Unit ten: We had a great time Past simple, regular and irregular Questions, negatives, ago
Week 11	Unit eleven: | can do that! Can/can't, adverbs, requests
Week 12	Unit twelve: Please and thank you I'd like, some and any Like and would like
Week 13	Unit thirteen: Here and now Present continuous Present simple and present continuous
Week 14	Unit fourteen: It's time to go! Future plans, writing email and information letter
Week 15	Revision
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	John and liz Soar. (New Headway Beginner) 4th edition. Oxford: Oxford University Press.	
Recommended Texts	1- "The Elements of Style" by William Strunk Jr. and E.B. White:	

	This classic guide offers valuable advice on writing style and grammar, essential for clear and effective communication. 2- "On Writing Well" by William Zinsser: Zinsser's book is a practical guide that covers different types of writing, including technical writing, and provides insights on improving clarity and precision. 3- "Technical Communication: A Reader-Centered Approach" by Paul V. Anderson: This book focuses specifically on technical communication, which is crucial for engineering students. It covers writing reports, manuals, and other technical documents.	
Websites	Purdue OWL (Online Writing Lab): Purdue OWL is a fantastic resource for writing and citation guidelines. It covers a wide range of topics, from general writing principles to specific guidelines for different citation styles. Grammarly: Grammarly is an online writing assistant that can help you improve your grammar, spelling, and overall writing style. It's a useful tool for both native and non-native English speakers. IEEE Author Center: If you're required to follow IEEE citation and writing style, the IEEE Author Center provides guidelines and resources for writing technical papers and articles.	

Grading Scheme
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(0 – 49)				

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