Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	ELECTRICAL MACHINES AND DC GENERATORS	Module Delivery
Module Type	CORE	☒ Lecture
Module Code	**MECH-412**	☒ Lab
ECTS Credits	5	☒ Tutorial
SWL (hr/sem)	125	

Module Level		4	Semester (s) offered		2
Administering Department		Mechanical Engineering	College	Engineering	
Module Leader		Mohammed Omer Salih	e-mail	eng.mos@tu.edu.iq	
Module Leader's Acad. Title		Lecture	Module Leader's Qualification	M. Sc.	
Module Tutor	None		e-mail	None	
Peer Reviewer Name			e-mail		
Review Committee Approval		01/06/2023	Version Number	1.0	

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	*The module introduces students to the fundamental principles of electric and magnetic fields at low frequencies and provides an overview of the working principles of transformers and DC electrical machines. Learn the construction of dc machine, and enhance the students' skills for the principles of commutation and armature reaction. Then they learn various types of dc machines including characteristics* *Subject content aims:* • *To introduce students to the main parameters and properties of electric and magnetic fields at low frequencies.* • *To introduce students to the principles of electro-mechanics and electromechanical energy conversion to show how electromagnetic fields can be used to induce forces and torques on current carrying conductors.* • *To introduce students to the basics of electrical machine construction and the structure and operational principles of DC machines.* • *To introduce students to the concept of magnetic circuits and the operational principles and characteristics of transformers.* *Graduate skills aims:* • *To develop skills in basic numerical and analytical techniques.* • *To develop professional laboratory working practices.*

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. *Understand and use Ampere's Law to calculate the flux in simple types of magnetic circuits with and without air gaps, so as to be able to analyze magnetic circuits using the concepts of magneto motive force and magnetic reluctance.* 2. *Understand and be able to state Faraday's Law and know that the induced EMF in a coil is proportional to the rate of change of magnetic flux through that coil.* 3. *Demonstrate an understanding of the relations between flux linkage, inductance and energy.* 4. *Understand the concept of mutual inductance and for a two winding transformer be able to draw the equivalent circuit and calculate the voltage, current and impedance ratio.* 5. *Demonstrate an understanding of how magnetic fields induce a force on a current carrying coil and be able to calculate the torque on such a coil.* 6. *Demonstrate an understanding of basic electrical machine construction and terminology and be able to explain the operation of a DC machine.*
Indicative Contents المحتويات الإرشادية	*Indicative content includes the following.* • *Basic principles of electromagnetic machines. Direct Current Generators and Motors (6 hrs)* • *Types and characteristics of DC Electrical Machines and Transformers (12 hrs)* • *Ideal and practical transformers and their circuit models (12 hrs)* • *Evaluate the design and efficiency of electrical machines (9 hrs)* • *Apply mathematical principles to solve analytical problems on electrical machines (15 hrs)* •

Course Description	*This course aims to introduce the student to establish fundamental knowledge of the main technologies for the generation and transformation of electrical power with an emphasis on their operating principles, their stability when interconnected and techniques for their control.*

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.*

Student Workload (SWL)			
الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **60** **In class tests** **4**	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 21** **Prepartion for tests** **20** **Homeworks** **20**	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

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

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري
	Material Covered
Week 1	*General principle of rotating electrical machines*
Week 2	*Construction of DC machines*
Week 3	*EMF and torque Equation of DC machines*
Week 4	*Types of armature winding of dc machines*
Week 5	*Armature reaction in DC machines*
Week 6	*Calculating demagnetizing and cross-magnetizing force*
Week 7	***Midterm exam***
Week 8	*Classification of DC generators*
Week 9	*The fundamental characteristics of DC Generators*
Week 10	*Condition required for buildup voltage for self-excited DC Generator*
Week 11	*Formula and equations of different types of DC Generators*
Week 12	*Parallel operation of DC Generators*
Week 13	*Losses and efficiency of DC Generator*
Week 14	*Voltage regulation of DC Generator*
Week 15	*Round up*
Week 16	***Final Exam***

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: The measurement devices
Week 2	Lab 2: DC Shunt Generator No load test
Week 3	Lab 3: DC Shunt Generator load test
Week 4	Lab 4: DC Series Generator load test
Week 5	Lab 5: DC Compound Generator load test
Week 6	Lab 6: DC Separately excited Generator load test

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Electrical Machinery Fundamentals, Stephen J Chapmans, 4th edition, MicGraw Hill, 2005.**	Yes
Recommended Texts	**2-Electrical Machines, D. P. Kothari and I. J. Nagrath, 4th edition, MicGraw Hill, 2010**	No
Websites	http://umich.edu/~elements/5e/lectures/index.html	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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.

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وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	ELECTRICAL MACHINES AND DC GENERATORS	Module Delivery
Module Type	CORE	☒ Lecture
Module Code	**MECH-412**	☒ Lab
ECTS Credits	5	☒ Tutorial
SWL (hr/sem)	125	

Module Level	4	Semester (s) offered	2
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader	Mohammed Omer Salih	**e-mail**	eng.mos@tu.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	M. Sc.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	*The module introduces students to the fundamental principles of electric and magnetic fields at low frequencies and provides an overview of the working principles of transformers and DC electrical machines. Learn the construction of dc machine, and enhance the students' skills for the principles of commutation and armature reaction. Then they learn various types of dc machines including characteristics* *Subject content aims:* • *To introduce students to the main parameters and properties of electric and magnetic fields at low frequencies.* • *To introduce students to the principles of electro-mechanics and electromechanical energy conversion to show how electromagnetic fields can be used to induce forces and torques on current carrying conductors.* • *To introduce students to the basics of electrical machine construction and the structure and operational principles of DC machines.* • *To introduce students to the concept of magnetic circuits and the operational principles and characteristics of transformers.* *Graduate skills aims:* • *To develop skills in basic numerical and analytical techniques.* • *To develop professional laboratory working practices.*

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. *Understand and use Ampere's Law to calculate the flux in simple types of magnetic circuits with and without air gaps, so as to be able to analyze magnetic circuits using the concepts of magneto motive force and magnetic reluctance.* 2. *Understand and be able to state Faraday's Law and know that the induced EMF in a coil is proportional to the rate of change of magnetic flux through that coil.* 3. *Demonstrate an understanding of the relations between flux linkage, inductance and energy.* 4. *Understand the concept of mutual inductance and for a two winding transformer be able to draw the equivalent circuit and calculate the voltage, current and impedance ratio.* 5. *Demonstrate an understanding of how magnetic fields induce a force on a current carrying coil and be able to calculate the torque on such a coil.* 6. *Demonstrate an understanding of basic electrical machine construction and terminology and be able to explain the operation of a DC machine.*
Indicative Contents المحتويات الإرشادية	*Indicative content includes the following.* • *Basic principles of electromagnetic machines. Direct Current Generators and Motors (6 hrs)* • *Types and characteristics of DC Electrical Machines and Transformers (12 hrs)* • *Ideal and practical transformers and their circuit models (12 hrs)* • *Evaluate the design and efficiency of electrical machines (9 hrs)* • *Apply mathematical principles to solve analytical problems on electrical machines (15 hrs)* •

Course Description	*This course aims to introduce the student to establish fundamental knowledge of the main technologies for the generation and transformation of electrical power with an emphasis on their operating principles, their stability when interconnected and techniques for their control.*

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.*

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 60 **In class tests** 4	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 21 **Prepartion for tests** 20 **Homeworks** 20	61	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

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

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري
	Material Covered
Week 1	*General principle of rotating electrical machines*
Week 2	*Construction of DC machines*
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Week 10	*Condition required for buildup voltage for self-excited DC Generator*
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Week 12	*Parallel operation of DC Generators*
Week 13	*Losses and efficiency of DC Generator*
Week 14	*Voltage regulation of DC Generator*
Week 15	*Round up*
Week 16	*Final Exam*

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: The measurement devices
Week 2	Lab 2: DC Shunt Generator No load test
Week 3	Lab 3: DC Shunt Generator load test
Week 4	Lab 4: DC Series Generator load test
Week 5	Lab 5: DC Compound Generator load test
Week 6	Lab 6: DC Separately excited Generator load test

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Electrical Machinery Fundamentals, Stephen J Chapmans, 4th edition, MicGraw Hill, 2005.**	Yes
Recommended Texts	**2-Electrical Machines, D. P. Kothari and I. J. Nagrath, 4th edition, MicGraw Hill, 2010**	No
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APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	HEATING, VENTILATION AND AIR CONDITIONING (HVAC)	**Module Delivery**	
Module Type	SUPLEMENT	☐ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MECH-409		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	4	**Semester (s) offered**	2
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader	Prof. Dr. Maki Hag Zaidan	**e-mail**	makihajzaidan@tu.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Assist. Prof. Dr. Samer Mahmoud khalaf	**e-mail**	samerkhalaf@tu.edu.iq
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Thermodynamics	**Semester**	MECH-101

	Fluid Mechanics 1		MECH-201
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
<div dir="rtl">أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</div>

Module Aims <div dir="rtl">أهداف المادة الدراسية</div>	1. To define the main concepts of Heating, Ventilation and Air Conditioning. 2. To explain the physical differences of Heating, Ventilation and Air Conditioning. 3. To Derive the equations of relative humidity and moister content. 4. To analyze the humidification and dehumidification processes. 5. To develop the optimum methods of air mixing and air supply condition. 6. To the consider the effect of heat sources on cooling load. 7. To have a robust awareness about some applications such as calculation of overall heat transfer coefficient and wall surface temperature. 8. To understand the principals and performance of Heat Gain from solar and renewable sources.
Module Learning Outcomes <div dir="rtl">مخرجات التعلم للمادة الدراسية</div>	At the end of this course, the students will be able to: 1. Understand the concepts of Air-Conditioning. 2. Solve the problems related to the Air mixing and air supply condition. 3. Analyze the comfortable condition. 4. Determine the heating and cooling load. 5. Find out the effect of heating or cooling in building. 6. Explain the effect of heat gain from solar.
Indicative Contents <div dir="rtl">المحتويات الإرشادية</div>	1. **Basic concepts of Heating, Ventilation and Air Conditioning**: Duct design by constant and regain method, duct design by velocity method, physical differences between flow types, The adiabatic steady flow ellipse, stagnation state, critical state. 2. **Constant Area Duct Flow**: Frictional flow in constant area duct, governing equation of frictional flow, fanno line, relations for frictional flow, frictionless flow with heat transfer in constant area duct, governing equation of frictionless flow with heat transfer, Rayleigh line 3. **Fans performance**: Fan system characteristics curves, fan system characteristics curves, fan similarity laws. 4. **Pipings:** Friction losses in pipes, pipe design. 5. **Heating, Ventilation and Air-Conditioning**: Thermally activated absorption technology, cavitation and pumps.
Course Description	The course introduces Heating, Ventilation and Air Conditioning and its constitutive equations. The physical concepts, basic concepts of Heating, Ventilation and Air Conditioning, Duct design by constant and regain method, duct design by velocity method, physical differences between flow types. This course aims to establish fundamental knowledge of Heating, Ventilation and Air Conditioning design and engineering. To achieve this goal, fundamentals of thermodynamics, heat transfer, and transport physics applied to Heating, Ventilation and Air Conditioning systems. Analysis of Heating, Ventilation and Air Conditioning in thermal Air-Conditioning systems will be offered. Topics include Fans performance, Fan system characteristics curves, Fan

	system characteristics curves, fan similarity laws. Also, this course discusses Heating, Ventilation and Air Conditioning: Thermally activated absorption technology. Design and selection of Heating, Ventilation and Air Conditioning systems. All the numerical examples will be in SI units.

<table>
<tr><td colspan="2">Learning and Teaching Strategies
استراتيجيات التعلم والتعليم</td></tr>
<tr>
<td>Strategies</td>
<td>The module will use a range of learning and teaching strategies, including:
1. Lectures: To provide students with an overview of the main concepts and principles.
2. Labs: To provide students with hands-on experience of devices and instruments.
3. Assignments and Quizzes: To provide students with opportunities to apply their knowledge and skills to real-world problems and check their understanding.
4. Scientific visits and trips: To provide a real life experience by visiting one of the industrial sites or power stations.
5. Project: To test the student knowlage of designing fabrication and testing one model of Heating, Ventilation and Air Conditioning concepts.</td>
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</table>

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
In class lectures	45			
Discussions	15			
In class tests	4			
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Project	16			
Preparation for tests, memorizing	20			
Writing reports	20			
Homeworks	30			
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	10% (10)	6, 10	LO #2, 3,4, 5 and 6
	Project	15	15% (15)	Continuous	LO # 2, 4, and 6
	Lab	15	15% (15)	Continuous	LO # 1 and 6
Summative	**Midterm Exam**	1	10% (10)	7	LO # 1-3

assessment	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Duct design by Constant and regain method
Week 2	Duct design by velocity method
Week 3	Fans performance
Week 4	Fan system characteristics curves
Week 5	Fan similarity laws
Week 6	Friction losses in pipes, Pipe design
Week 7	Midterm
Week 8	Pumps system characteristics curves and Pump performance
Week 9	Compression Refrigeration cycle
Week 10	heat pump cycle
Week 11	Refrigerant components for different systems
Week 12	Refrigerant Equipment's and Volumetric Efficiency for Reciprocating Compressor
Week 13	Thermally activated absorption technology
Week 14	Absorption cycle
Week 15	Heat Exchanger of the Absorption cycle
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Wind tunnel (Groupe A)
Week 2	Exp. 1: Wind tunnel (Groupe B)
Week 3	Exp. 1: Wind tunnel (Groupe C)
Week 4	Exp. 1: Wind tunnel (Groupe D)
Week 5	Exp. 1: Wind tunnel (Groupe E)
Week 6	Exp. 2: Pelton turbine (Groupe A)
Week 7	Exp. 2: Pelton turbine (Groupe B)

Week 8	Exp. 2: Pelton turbine (Groupe C)
Week 9	Exp. 2: Pelton turbine (Groupe D)
Week 10	Exp. 3: Pelton turbine (Groupe E)
Week 11	Exp. 3: Centrifugal pump (Groupe A)
Week 12	Exp. 3: Centrifugal pump (Groupe B)
Week 13	Exp. 3: Centrifugal pump (Groupe C)
Week 14	Exp. 3: Centrifugal pump (Groupe D)
Week 15	Exp. 3: Centrifugal pump (Groupe E)
Week 16	Experimental Test

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Refrigeration and Air-Conditioning, By Stoecher, First edition, McGraw-Hill, 2006.	Yes
Recommended Texts	1. Air-Conditioning and Refrigeration, By Jones, First edition, McGraw-Hill, 1983. 2. مبادئ هندسة التكييف والتثليج، د. حالد الجودي، ١٩٨٦ 3. A text book of hydraulic machines, R. S. Khurmi.	Yes
Websites		

APPENDIX:

GRADING SCHEME				
مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR

وصف المادة الدراسية

Module Title	CONTROL 1		Module Delivery	
Module Type	CORE		**Theory** **Lecture** **Tutorial** **Practical** **Seminar**	
Module Code	MECH-404			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level		4	Semester (s) offered	1
Administering Department		mechanical Engineering	College	Engineering
Module Leader	Adel Mahmood Bash		e-mail	Adelbash@tu.edu.iq
Module Leader's Acad. Title		Professor	Module Leader's Qualification	MSc
Module Tutor	None		e-mail	None
Peer Reviewer Name	None		e-mail	None
Review Committee Approval		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, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	The main objectives of the course are: 1- Introduce the principles and applications of linear control systems and Laplace transform. 2- The basic concepts of block diagram reduction, transfer function representation, time response and time domain analysis, solutions to linear time invariant systems. 3- Study and analyze the different methods of stability analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After going through this course, the student gets 1- A thorough knowledge on open loop and closed loop control systems, concept of feedback in control systems. 2- Understanding of transfer function representation through block diagram algebra and signal flow graphs. 3- Time response analysis of different order systems through their characteristic equation. 4- Time domain specifications, stability analysis of control systems in s-domain through-H criteria. 5- Root locus techniques, frequency response analysis through Bode diagrams and Polar plots.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction: Concept of control system, Classification of control systems - Open loop and closed loop control systems, Differences, Examples of control systems- Effects of feedback, Feedback Characteristics. • Transfer Function Representation: Block diagram algebra, Determining the Transfer function from Block Diagrams, Signal flow graphs (SFG) - Reduction using Mason's gain formula- Transfer function of SFG's. • Time Response Analysis: Standard test signals, Time response of first order systems, Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications, Steady state response, Steady state errors and error constants. PID controllers: Effects of proportional derivative, proportional integral systems on steady state error. • Stability Analysis in S-Domain: The concept of stability – Routh-Hurwitz's stability criterion – qualitative stability and conditional

	stability – Limitations of Routh-Hurwitz's stability. • Root Locus Technique: Concept of root locus - Construction of root locus, Effects of adding poles and zeros to G(s) H(s) on the root loci.
Course Description	A classical control system course is a specialized field of study that focuses on the principles, theories, and techniques used in the design and analysis of control systems. Classical control refers to the traditional methods and tools used before the advent of modern control theory, which typically includes techniques such as proportional-integral-derivative (PID) control, root locus analysis,

<table>
<tr><td colspan="2" align="center">Learning and Teaching Strategies
استراتيجيات التعلم والتعليم</td></tr>
<tr><td>Strategies</td><td>The objective of the learning and instruction strategy is to: introduce students to the fundamental concepts and mathematical models used in control systems in a course on classical control systems. They learn about the various control system components, such as sensors, actuators, controllers, and plant models.</td></tr>
</table>

<table>
<tr><td colspan="4" align="center">Student Workload (SWL)
الحمل الدراسي للطالب</td></tr>
<tr>
<td>Structured SWL (h/sem)
الحمل الدراسي المنتظم للطالب خلال الفصل
In class lectures   60
In class tests   4</td>
<td>64</td>
<td>Structured SWL (h/w)
الحمل الدراسي المنتظم للطالب أسبوعيا</td>
<td>4.3</td>
</tr>
<tr>
<td>Unstructured SWL (h/sem)
الحمل الدراسي غير المنتظم للطالب خلال الفصل
Library, dorm, home memorizing 30
Prepartion for tests   11
Homeworks   20</td>
<td>61</td>
<td>Unstructured SWL (h/w)
الحمل الدراسي غير المنتظم للطالب أسبوعيا</td>
<td>4</td>
</tr>
<tr>
<td>Total SWL (h/sem)
الحمل الدراسي الكلي للطالب خلال الفصل</td>
<td colspan="3">125</td>
</tr>
</table>

<table>
<tr><td colspan="6" align="center">Module Evaluation
تقييم المادة الدراسية</td></tr>
<tr>
<td colspan="2"></td>
<td>Time (hr)</td>
<td>Weight (Marks)</td>
<td>Week Due</td>
<td>Relevant Learning Outcome</td>
</tr>
<tr>
<td rowspan="2">Formative assessment</td>
<td>Quizzes</td>
<td>2</td>
<td>10% (10)</td>
<td>all</td>
<td>LO #1, 2, 3, and 4</td>
</tr>
<tr>
<td>Assignments</td>
<td>6</td>
<td>30% (30)</td>
<td>all</td>
<td>LO # 1, 2, 3, 4, 5 and 6</td>
</tr>
<tr>
<td rowspan="2">Summative assessment</td>
<td>Midterm Exam</td>
<td>2</td>
<td>10% (10)</td>
<td>7</td>
<td>LO # 1-3</td>
</tr>
<tr>
<td>Final Exam</td>
<td>3</td>
<td>50% (50)</td>
<td>16</td>
<td>All</td>
</tr>
</table>

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: Concept of control system, Classification of control systems - Open loop and closed loop control systems, Differences, Examples of control systems- Effects of feedback, Feedback Characteristics.
Week 2	Transfer Function Representation
Week 3	Block diagram algebra
Week 4	Determining the Transfer function from Block Diagrams
Week 5	Signal flow graphs (SFG) - Reduction using Mason's gain formula
Week 6	Transfer function of SFG's.
Week 7	*Midterm exam*
Week 8	Time Response Analysis: Standard test signals
Week 9	Time response of first order systems, Characteristic Equation of Feedback control systems
Week 10	Transient response of second order systems - Time domain specifications
Week 11	Steady state response, Steady state errors and error constants
Week 12	Stability Analysis in S-Domain
Week 13	The concept of stability – Routh-Hurwitz's stability criterion – qualitative stability and conditional stability
Week 14	Root Locus Technique: Concept of root locus - Construction of root locus,
Week 15	Effects of adding poles and zeros to G(s) H(s) on the root loci.
Week 16	*Final Exam*

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	1-Plot the pole-zero configuration in s-plane for the given transfer function
Week 2	2- Determine the transfer function for given closed loop system in block diagram representation
Week 3	3-Time Response Characteristic of A first Order System
Week 4	4- Time Response Characteristic of A second Order System

Week 5	5-Determine the steady state errors of a given transfer function
Week 6	6-Plot root locus of given transfer function, locate closed loop poles for different values of k.
Week 7	7-Plot bode plot of given transfer function. Also determine the relative stability by measuring gain and phase margins.

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	-Modern Control Engineering" by Katsuhiko Ogata.	Yes
Recommended Texts	1- Control Systems Theory and Applications - S. K. Bhattacharya, Pearson. 2. Control Systems Engineering - S. Palani, TMH. 3. Control Systems - N. K. Sinha, New Age International (P) Limited Publishers. 4. Control Systems by S.Hasan Saeed, KATSON BOOKS.	No
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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 DESCRIPTOR
وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	PRINCIPLES OF AIR CONDITIONING	**Module Delivery**
Module Type	SUPLEMENT	☐ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	MECH-405	
ECTS Credits	5	
SWL (hr/sem)	125	

Module Level	4	**Semester (s) offered**		1
Administering Department	Mechanical Engineering	**College**	Engineering	
Module Leader	Prof. Dr. Maki Hag Zaidan	**e-mail**	makihajzaidan@tu.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Assist. Prof. Dr. Samer Mahmoud khalaf	**e-mail**	samerkhalaf@tu.edu.iq	
Peer Reviewer Name		**e-mail**		
Review Committee Approval	01/06/2023	**Version Number**	1.0	

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Thermodynamics Fluid Mechanics 1	**Semester**	MECH-101 MECH-201
Co-requisites module	None	**Semester**	-

<table>
<tr><td colspan="2" align="center">Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr>
<td>Module Aims
أهداف المادة الدراسية</td>
<td>
1. To define the main concepts of Air-Conditioning.
2. To explain the physical differences of Air-Conditioning.
3. To Derive the equations of relative humidity and moister content.
4. To analyze the humidification and dehumidification processes.
5. To develop the optimum methods of air mixing and air supply condition.
6. To the consider the effect of heat sources on cooling load.
7. To have a robust awareness about some applications such as calculation of overall heat transfer coefficient and wall surface temperature.
8. To understand the principals and performance of Heat Gain from solar and renewable sources.
</td>
</tr>
<tr>
<td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td>
<td>
At the end of this course, the students will be able to:

1. Understand the concepts of Air-Conditioning.
2. Solve the problems related to the Air mixing and air supply condition.
3. Analyze the comfortable condition.
4. Determine the heating and cooling load.
5. Find out the effect of heating or cooling in building.
6. Explain the effect of heat gain from solar.
</td>
</tr>
<tr>
<td>Indicative Contents
المحتويات الإرشادية</td>
<td>
1. Basic concepts of Air-Conditioning: Moister content, Relative humidity, Physical differences between flow types, The adiabatic steady flow, Saturation state, Critical state and dew point.
2. Air mixing and air supply condition: Overall heat transfer Coefficient calculation and wall surface temperature calculation, Comfortable conditions, Indoor air quality.
3. Design temperature and outdoor and indoor room temperatures: Introduction, Governing equations of heating load calculation, Heat loss through building structure, Infiltration and space heating, Cooling load Calculation, heat sources.
4. Constant Area Duct Flow: Frictional flow in constant area duct, Governing equation of frictional flow, Fanno line, Relations for frictional flow, Frictionless flow with heat transfer in constant area duct, Governing equation of frictionless flow with heat transfer, Rayleigh line.
5. Pressure drop of internal fluid flow through circular and rectangular duct and fittings: Design and selection of Air- Conditioning systems.
</td>
</tr>
<tr>
<td>Course Description</td>
<td>
This course aims to establish fundamental knowledge of Air-Conditioning design and engineering. To achieve this goal, fundamentals of thermodynamics, heat transfer, and transport physics applied to Air-Conditioning systems. Topics include design temperature and outdoor and indoor room temperatures, Introduction, governing equations of heating load calculation, heat loss through building structure, Infiltration and space heating, cooling load calculation, heat sources. Also, this course discusses Pressure drop of internal fluid flow through circular and rectangular duct and fittings.
</td>
</tr>
</table>

	Design and selection of Air- Conditioning systems. All the numerical examples will be in SI units.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The module will use a range of learning and teaching strategies, including: 1. **Lectures**: To provide students with an overview of the main concepts and principles. 2. **Labs**: To provide students with hands-on experience of devices and instruments. 3. **Assignments and Quizzes**: To provide students with opportunities to apply their knowledge and skills to real-world problems and check their understanding. 4. **Scientific visits and trips**: To provide a real life experience by visiting one of the industrial sites or Buildings. 5. **Project:** To test the student knowlage of designing fabrication and testing one model of Air- Conditioning systems concepts.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
In class lectures	45			
Discussions	15			
In class tests	4			
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		61	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Project	15			
Preparation for tests, memorizing	15			
Writing reports	15			
Homeworks	16			
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	١٢٥			

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments (Homework's)	5	10% (10)	2, 4, 6, 8, 10	LO # 1, 2, 3, 4, 5 and 6
	Seminars	4	5% (5)	Continuous	
Summative	**Lab**	15	15% (15)	Continuous	LO # 1 and 6

assessment	Midterm Exam	2	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic concepts of Air Conditioning: Air velocity, Pressure, Moist air properties.
Week 2	The adiabatic steady flow, Saturation and Dew point, Air psychometric chart.
Week 3	Calculation of relative humidity: Partial steam pressure, Partial dry air pressure, Critical and saturation conditions.
Week 4	Air mixing and air supply condition.
Week 5	Overall heat transfer Coefficient calculation and wall surface temperature calculation.
Week 6	Comfortable conditions, Indoor air quality
Week 7	Midterm Exam
Week 8	Design temperature and outdoor and indoor room temperatures.
Week 9	Heating load calculation.
Week 10	Heat loss through building structure, Infiltration and space heating.
Week 11	Cooling load Calculation, heat sources.
Week 12	Heat gain from solar intensity and renewable energy sources.
Week 13	Pressure drop of internal fluid flow through circular and rectangular duct and fittings.
Week 14	The effect of cavitation on the internal flow.
Week 15	Design and selection of Air- Conditioning systems
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Exp. 1: Wind tunnel (Groupe A)
Week 2	Exp. 1: Wind tunnel (Groupe B)
Week 3	Exp. 1: Wind tunnel (Groupe C)
Week 4	Exp. 1: Wind tunnel (Groupe D)
Week 5	Exp. 1: Wind tunnel (Groupe E)

Week 6	Exp. 2: Pelton turbine (Groupe A)
Week 7	Exp. 2: Pelton turbine (Groupe B)
Week 8	Exp. 2: Pelton turbine (Groupe C)
Week 9	Exp. 2: Pelton turbine (Groupe D)
Week 10	Exp. 3: Pelton turbine (Groupe E)
Week 11	Exp. 3: Centrifugal pump (Groupe A)
Week 12	Exp. 3: Centrifugal pump (Groupe B)
Week 13	Exp. 3: Centrifugal pump (Groupe C)
Week 14	Exp. 3: Centrifugal pump (Groupe D)
Week 15	Exp. 3: Centrifugal pump (Groupe E)
Week 16	Experimental Test

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Refrigeration and Air-Conditioning, By Stoecher, First edition, McGraw-Hill, 2006.	No
Recommended Texts	1. Air-Conditioning and Refrigeration, By Jones, First edition, McGraw-Hill, 1983. ٢. مبادئ هندسة التكييف والتثليج، د. حالد الجودي، ١٩٨٦ 3. A text book of hydraulic machines, R. S. Khurmi.	No
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information	
معلومات المادة الدراسية	

Module Title	POWER PLANTS ENGINEERING	Module Delivery	
Module Type	CORE		Theory Lecture Tutorial Practical Seminar
Module Code	MECH-406		
ECTS Credits	5		
SWL (hr/sem)	125		

Module Level		4	Semester (s) offered		1
Administering Department		mechanical Engineering	College	Engineering	
Module Leader	Dr. Thamir Khalil Ibrahim		e-mail	thamirmathcad@tu.edu.iq	
Module Leader's Acad. Title		Professor	Module Leader's Qualification	Ph.D	
Module Tutor	None		e-mail	None	
Peer Reviewer Name		Dr. Raaid Rashad Jassem Al Doury	e-mail	raaidaldoury@tu.edu.iq	
Review Committee Approval		01/06/2023	Version Number	1.0	

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MECH-101, MECH-209, MECH-301	**Semester**	- 1,2
Co-requisites module		**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	-To provide a simple understanding of the power plant engineering -To present a wealth of real-world engineering examples to give students a feel for how power plants is applied in engineering practice. -To develop an intuitive understanding of power plants by emphasizing the physics and physical arguments
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: 1. Describe and analyze different types of sources and mathematical expressions related to thermodynamics and various terms and factors involved with power plant operation. 2. Analyze the working and layout of steam power plants and the different systems comprising the plant and discuss its economic and safety impacts. 3. Combine concepts from previously learned courses to define the working principle of the conventional power plant, its layout, and safety principles and compare it with plants of other types. 4. Describe the working principle and basic components of the nuclear power plant and the economic and safety principles involved with it. 5. Discuss the working principle and basic components of the hydro electric plants and the economic principles and safety precautions involved with it. 6. Discuss and analyze the mathematical and working principles of different Solar power plants.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction to Steam cycle power plants (12hrs) • The Gas turbine power plants performance introduced (5hrs) • A general understanding of combined cycle power plants. (6hrs) • Exposes students to some exciting real-world applications of power plants early in this course, and helps them establish a sense of the monetary value of energy(17hrs)
Course Description	This Course provides a simple understanding of the power plant engineering. The course contains the details of steam and gas thermal power plants, hydro power plants, nuclear power plants, along with solar, wind and geothermal energy power systems in addition to the direct energy conversion. The economics of power generation and the environmental aspect of power generation are also being addressed in this course.

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل In class lectures 30 Discussion 15 In class tests 3	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل Library, dorm, home memorizing 31 Preparation for tests 21 Homework's 25	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	All	All
	Assignments	5	20% (20)	All	All
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-3
	Final Exam	3	60% (60)	16	All
Total assessment			100% (100 Marks)		

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري
	Material Covered
Week 1	The energy scenario, steam power plants, fuel handling, ash handling, chimney draught
Week 2	Fossil fuel steam generators, high pressure boilers, performance of boilers, fuels and combustion, steam turbines. Steam power plant cycle (Ranking cycle), Power station superheated processes. Power station reheated processes, Steam power plant refrigeration- processes Open feed water – close backward feed water , close forward heater
Week 3	The function of power plant (boiler operation) fire tube boiler, - water tube boiler water circulation in boiler. Steam turbine Impulse steam turbine- the principle of impulse steam turbine (power produced by the efficiency of stages). Reaction turbine: (principle of reaction turbine, velocity diagrams, power produced by turbine stages, and efficiency of stages).
Week 4	Condensers, principle condenser operation, circulation of water system, Pumping system (circulation of water). Cooling tower (system classification, and operation performance),
Week 5	Air compressor (classification, system operation), Combustion chamber (combined the air and fuel, design) principle, the efficiency of the combustion chamber, and operation
Week 6	Performance analysis of gas turbine power plants
Week 7	Midterm exam
Week 8	Introduction to combined cycle power
Week 9	Thermal analysis of the combined cycle power
Week 10	Classification of hydro-plants , hydraulic turbines, hydro plant controls, problem solving
Week 11	Principles of nuclear energy, thermal fission reactors and Power Plants, Fast breeder reactors,
Week 12	Solar energy, solar thermal energy
Week 13	Hybrid Solar Gas-Turbine Power Plants
Week 14	Nuclear power plant, Principle of nuclear power plant, Pressurized water rector (PWR), Boiling –water reactor (BWR).
Week 15	Energy storage, economics of power generation, economics of power generation, environmental aspect of power generation, problem solving
Week 16	**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	Cengel, Y., & Thermodynamics: An engineering Approach, *Seven edi*.	Yes
Recommended Texts	Applied thermodynamics for engineering technologists, third edi, by T.D.EASTOP	Yes
Websites		

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GRADING SCHEME مخطط الدرجات				
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Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTOR

وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	GRADUATION PROJECT		Module Delivery	
Module Type	CORE		Theory Lecture Seminar	
Module Code	MECH-407			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	4	**Semester (s) offered**	2	
Min number of students	15	**Max number of students**	80	
Administering Department	Mechanical Engineering	**College**	Engineering	
Module Leader	All faculty members	**e-mail**	-	
Module Leader's Acad. Title	-	**Module Leader's Qualification**	-	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name		**e-mail**		
Review Committee Approval	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, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	The main aim of this course is to prepare students for the practical tasks of the work place after graduation. This includes building his/her ability to perform a complete project.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Upon completion of this course, the student should be able to: 2. Structure a working schedule for the project. 3. Present Clear aim and objectives of the graduation project. 4. Present the literature review with relation to the selected topic. 5. Carry out the design (or any topic selected). 6. Write a technical report. 7. Defend the technical report in front of a committee and be able to answer questions asked by the committee members.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: - Basic concepts of a project. (6hrs) - Physical and Mechanical Properties of a product (6 hr) - Storage, handling and transportation (4 hr) - Material balance (16 hrs)
Course Description	Graduation project leading to BSc. Degree, arranged between a student and the faculty member. The aim of the project must be one of the following: application of new scientific methods for solving different mechanical problems, and their modeling, analysis and Investigation of new research areas in mechanical engineering fields. Design, develop and present a project based on the knowledge acquired during undergraduate studies.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The learning and teaching **strategy** is designed to: Carefully describe the course design and teaching methodology for project and applications lectures specifically aimed at small college and university instruction.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
In class lectures	0			
Office hours	20			
In class tests	0			
Discussions	6			
Practical	4			

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل			Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Library, dorm, home searching	40	67		
Preparation for final test	10			
Technical writing	20			
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		100		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Discussion	30	30% (30)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	0	0% (0.0)	-	LO # 1, 2, 3, 4, 5 and 6
	Seminars	10	10% (10)	Continuous	All
Summative assessment	Midterm Exam	0	0% (0)	-	-
	Final defiance	3	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Sample identification and start applying the methodological framework
Week 2	Design, referee and review the research tool.
Week 3	Apply data collection tools
Week 4-5	Unloading, processing and analyzing data
Week 6-7-8	Draw and discuss conclusions and link the theoretical framework to the applied framework
Week 9-10	Extracting recommendations, building proposals and indicating the mechanisms for their implementation.
Week 11	Submit an initial copy of the project for review to the supervisor
Week 12	Submit the copy for linguistic review
Week 13	Submit the final version of the graduation project to the discussion committee
Week 15	**Posters presentation**
Week 15	**Graduation Project Discussion**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required References	Perry's Mechanical Engineers' Handbook, Ninth Edition. Don W. Green, Marylee Z. Southard McGraw Hill Professional, Jul 13, 2018 - Technology & Engineering - 2352 pages.	No
Recommended Texts	Coulson Richardson's Mechanical Engineering Vol.6 Mechanical Engineering Design 4th Edition. R. K. SINNOTT, J. M. COULSON, J. F. RICHARDSON. ELSEVIER BUTTERWORTH-HEINEMANN, OXFORD, 2005	Yes
Websites	TBD	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

<table>
<tr><td colspan="4" align="center">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td>MACHINE DESIGN - II</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td>CORE</td><td colspan="2" rowspan="4">Theory
Lecture
Tutorial
Practical
Seminar</td></tr>
<tr><td>Module Code</td><td>MECH-402</td></tr>
<tr><td>ECTS Credits</td><td>6</td></tr>
<tr><td>SWL (hr/sem)</td><td>150</td></tr>
<tr><td>Module Level</td><td>4</td><td>Semester (s) offered</td><td>1</td></tr>
<tr><td>Administering Department</td><td>mechanical Engineering</td><td>College</td><td>Engineering</td></tr>
<tr><td>Module Leader</td><td>Hazim Khaleel</td><td>e-mail</td><td>Hazimkhalil@tu.edu.iq</td></tr>
<tr><td>Module Leader's Acad. Title</td><td></td><td>Module Leader's Qualification</td><td></td></tr>
<tr><td>Module Tutor</td><td>None</td><td>e-mail</td><td>None</td></tr>
<tr><td>Peer Reviewer Name</td><td></td><td>e-mail</td><td></td></tr>
<tr><td>Review Committee Approval</td><td>01/06/2023</td><td>Version Number</td><td>1.0</td></tr>
</table>

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Machine Design I.	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	his module aims to introduce students to modern mechanical design with the emphasis of machine elements, and analyses these elements based upon extensive application of physics, mathematics and core mechanical engineering principles, including solid mechanics, fluid mechanics, and manufacturing. The student will learn major machine elements such as, springs, gears. The student will learn recommendations to make designs more economical, to simplify processes, and to minimize energy use and environmental impact. A project is an integral part of this course and exposes the student to various mechanical design processes and practices.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: 1. Understand and apply appropriate codes of practice and international standards. 2. Demonstrate knowledge and understanding of the mathematics and scientific principles related to the analysis of machine elements, components, and systems. 3. Demonstrate understanding of the structure of materials effects the mechanical properties of those materials 4. Analyze the lifetime of a spur, helical, bevel and worm gear elements 5. Design, model, and analyze gearing systems, lead screws, belt drives, and springs.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Lecture-30 hours • Tutorial-15 hours • Project supervision-15 hours • Practical Classes and workshops-15 hours • Exams 5 hours • Guided independent study-85 hours • Total: 150 hours
Course Description	Procedures for the practice of mechanical design, basic gearing design, lubrication, screws, belt and chain drives. Selection of component bought out from specialist suppliers, design and validation of components, selection of materials, manufacturing methods or systems concepts that are related to more than component. Use of appropriate software in the design process.

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 60 **In class tests** 4	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 30 **Preparation for tests** 26 **Homeworks** 30	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	all	LO #1, 2, 3, and 4
	Assignments	6	30% (30)	All	LO # 1, 2, 3, 4, 5 and 6
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Spur and helical gears
Week 2	Spur and helical gears
Week 3	Bevel gears

Week 4	Worm gears
Week 5	Screws and fasteners
Week 6	Screws and fasteners
Week 7	Design of welded joints
Week 8	Design of welded joints
Week 9	Spring design
Week 10	Spring design
Week 11	Flat belts
Week 12	V belts
Week 13	Chains
Week 14	Clutches and Brakes
Week 15	Clutches and Brakes
Week 16	**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	Mechanical engineering design. Tenth edition Shigley	few
Recommended Texts	− Machine elements. In mechanical. Design. Sixth edition. Robert l. Mott.	No

	– Machine design. Childs	
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB 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 DESCRIPTOR
وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	GRADUATION PROJECT	Module Delivery	
Module Type	CORE		Theory Lecture Seminar
Module Code	MECH-401		
ECTS Credits	4		
SWL (hr/sem)	100		

Module Level	4	Semester (s) offered	1
Min number of students	15	Max number of students	80
Administering Department	Mechanical Engineering	College	Engineering
Module Leader	All faculty members	e-mail	-
Module Leader's Acad. Title	-	Module Leader's Qualification	-
Module Tutor	None	e-mail	None
Peer Reviewer Name		e-mail	
Review Committee Approval	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, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

| Module Aims
أهداف المادة الدراسية	The main aim of this course is to prepare students for the practical tasks of the work place after graduation. This includes building his/her ability to perform a complete project.
Module Learning Outcomes

مخرجات التعلم للمادة الدراسية | 1. Upon completion of this course, the student should be able to:
2. Structure a working schedule for the project.
3. Present Clear aim and objectives of the graduation project.
4. Present the literature review with relation to the selected topic.
5. Carry out the design (or any topic selected).
6. Write a technical report.
7. Defend the technical report in front of a committee and be able to answer questions asked by the committee members. |
| Indicative Contents
المحتويات الإرشادية | Indicative content includes the following:
- Basic concepts of a project.   (6hrs)
- Physical and Mechanical Properties of a product   (6 hr)
- Storage, handling and transportation   (4 hr)
- Material balance   (16 hrs) |
| Course Description | Preparatory studies of the literature and data collection for the graduation project in a particular area of concentration and under the supervision of one of the faculty members. The course covers directed readings in the literature of civil engineering, introduction to research methods, seminar discussions dealing with special engineering topics of current interest. Planning, design, construction and management of an engineering project. Writing a technical report. |

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The learning and teaching **strategy** is designed to: Carefully describe the course design and teaching methodology for project and applications lectures specifically aimed at small college and university instruction.

Student Workload (SWL)
الحمل الدراسي للطالب

| Structured SWL (h/sem)
الحمل الدراسي المنتظم للطالب خلال الفصل | | 33 | Structured SWL (h/w)
الحمل الدراسي المنتظم للطالب أسبوعيا | 2.2 |
|---|---|---|---|---|
| In class lectures | 0 | | | |
| Office hours | 20 | | | |
| In class tests | 0 | | | |
| Discussions | 6 | | | |
| Practical | 4 | | | |

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		67	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Library, dorm, home searching	40			
Preparation for final test	10			
Technical writing	20			
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		100		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Discussion	30	30% (30)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	0	0% (0.0)	-	LO # 1, 2, 3, 4, 5 and 6
	Seminars	10	10% (10)	Continuous	All
Summative assessment	Midterm Exam	0	0% (0)	-	-
	Final defiance	3	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Select a research problem
Week 2	Preparing the general framework of the project: introduction, formulation of the problem (questions - hypotheses)
Week 3	Define concepts and terminology
Week 4	Objectives, Importance
Week 5-6-7	Limits, methodology
Week 8-9	Present the research plan to the supervisor and discuss it.
Week 10-11	Prepare the theoretical background using the latest sources and references
Week 12-13	Previous studies and commentary
Week 14	Submit the graduation project proposal to the supervisor for review and comments
Week 15	**Oral Presentation**
Week 16	**Final Seminar**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required References	Perry's Mechanical Engineers' Handbook, Ninth Edition. Don W. Green, Marylee Z. Southard McGraw Hill Professional, Jul 13, 2018 - Technology & Engineering - 2352 pages.	No
Recommended Texts	Coulson Richardson's Mechanical Engineering Vol.6 Mechanical Engineering Design 4th Edition. R. K. SINNOTT, J. M. COULSON, J. F. RICHARDSON. ELSEVIER BUTTERWORTH-HEINEMANN, OXFORD, 2005	Yes
Websites	TBD	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
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Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	ENERGY CONVERSION	Module Delivery	
Module Type	CORE	Theory Lecture Tutorial Practical Seminar	
Module Code	MECH-310		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	3	Semester (s) offered	2
Administering Department	Mechanical Engineering	College	Engineering
Module Leader	Dr. Manar S.M. Al-Jethelah	e-mail	m.aljethelah@tu.edu.iq
Module Leader's Acad. Title	Asst. Professor	Module Leader's Qualification	Ph.D.
Module Tutor	None	e-mail	None
Peer Reviewer Name	Dr. Maki Haj Zaidan	e-mail	makihajzaidan@tu.edu.iq
Review Committee Approval	01/06/2023	Version Number	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MECH-201, MECH-209, and MECH-209	**Semester**	1,2
Co-requisites module	MECH-209 and MECH-307	**Semester**	1,2

Module Aims, Learning Outcomes, Indicative Contents and Brief Description	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	This course is an undergrad course in energy stream. It will introduce the students' knowledge and concepts in energy conversion, analysis, and management. Present and developing technologies for conversion of thermal, nuclear, mechanical, renewable, and alternative energy will be studied. The course emphases on efficiency, performance, and environmental impact.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, the student should be able to: 1. Understand the basic scientific and design principles of several energy conversion. Also, the student will become skilled in engineering calculations of the performance and preliminary design of various energy conversion systems. 2. Describe and apply fundamental engineering principles and concepts. 3. Be aware with the environmental issues as the greenhouse effect and global climate change. 4. Evaluate and assessment competing energy conversion technologies on an economic and efficiency basis. 5. Select the best profits to achieve system design objectives on energy conversion. 6. Utilize engineering software packages, such as EES and Fluent, to solve and optimize problems in energy conversion
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Basic Review　　　　　　　　　(6 hrs) • Fossil Energy　　　　　　　　　(3 hrs) • Nuclear Energy　　　　　　　　(6 hrs) • Geothermal Energy　　　　　　(5 hrs) • Fuel Cell　　　　　　　　　　　(3 hrs) • Solar energy　　　　　　　　　(12 hrs) • Wind Energy and Hybrid system　(7 hrs)

	• Biomass	(3 hrs)

Course Description	This course aims to establish fundamental knowledge of energy conversion design and engineering. To achieve this goal, fundamentals of thermodynamics, heat transfer, and transport physics applied to energy conversion systems. Analysis of energy conversion in thermal, mechanical, nuclear, and electromechanical processes in power systems will be offered. Topics include fossil and nuclear power systems, solar energy, wind energy, biomass energy, and photovoltaic systems. Also, this course discusses strategies to increase energy efficiency and more environmentally friendly operations and assesses design alternatives and selection criteria.

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل In class lectures 45 In class tests 3	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل Library, dorm, home memorizing 20 Prepartion for tests 20 Homeworks 12	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 (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Quizzes	2	10% (10)	all	LO #1, 2, 3, and 4

Formative assessment	Assignments	6	30% (30)	All	LO # 1, 2, 3, 4, 5 and 6
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and scope of energy conversion
Week 2	Fundamentals of Energy Conversion: Energy forms, conversion systems and energy intensity
Week 3	Fossil Energy: fossil fuel resources and energy contents. Fuel and Combustion Calculations
Week 4	Nuclear Energy: nuclear reaction and energy conversion physics, nuclear power systems.
Week 5	Geothermal Energy
Week 6	Fuel Cell
Week 7	Midterm exam
Week 8	Solar-thermal energy: solar thermal radiation physics
Week 9	Solar-thermal energy: Active and passive solar-thermal energy collection and conversion systems.
Week 10	Solar-thermal energy: Applications
Week 11	Photoelectric energy: Photoelectric physics. Solar photovoltaic cell materials and technology
Week 12	Wind Energy: Wind interaction with objects fluid dynamics
Week 13	Wind Energy: Wind harvesting devices and systems
Week 14	Hybrid solar wind Design
Week 15	Biomass and Waste to Energy: Potential and resources of biomass and waste energy. Thermal-chemical and bio-chemical conversion methods.
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Demirel, Yaşar.** *Energy: production, conversion, storage, conservation, and coupling.* **Springer Science & Business Media, 2012. ISBN: 978-1-4471-2371-2**	No

Recommended Texts	Goswami, D. Yogi, and Frank Kreith, 2nd eds. *Energy conversion*. CRC press, 2017. ISBN: 978-1-4665-8482-2	No
Websites	---	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
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Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	ENGINEERING MATERIALS	Module Delivery	
Module Type	CORE	Theory Lecture Seminar Discussion	
Module Code	MECH-309		
ECTS Credits	5		
SWL (hr/sem)	125		

Module Level	3	Semester (s) offered	2
Min number of students	15	Max number of students	100
Administering Department	Mechanical Engineering	College	Engineering
Module Leader	Saad Ramadhan Ahmed	e-mail	Saadramadhan82@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	PhD
Module Tutor	None	e-mail	None
Peer Reviewer Name	Dr. Farouk M. Mahdi	e-mail	Farouk_1959_1996@tu.edu.iq
Review Committee Approval	01/06/2023	Version Number	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mechanics	**Semester**	1,2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	The objective of the course is to provide basic understanding of engineering materials, their structure and the influence of structure on mechanical, chemical, electrical and magnetic properties.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, the student should be able to: 1. explain basic relationships between structure and properties for metallic, ceramic, polymeric and composite materials, 2. make qualitative comparisons between materials and indicate the application areas of the most common engineering materials in the different classes of materials , 3. interpret and use binary phase diagrams, 4. describe the underlying mechanisms for hardening of metals, 5. describe the different methods of testing materials .
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Material structure and deformation mechanisms. (4 hrs) • Relationship between atomic bonds, microstructure and macroscopic properties. (12 hrs) • Phase diagrams. (4 hrs) • Materials testing. (12 hrs) • Properties and applications of engineering materials in all classes of materials: metals, polymers, ceramics and composites. (12 hrs)
Course Description	This course provides a fundamental behavior and properties of various engineering materials. Topics include introduction to mechanical behavior of materials, characteristics of metals, and selection of materials.

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 and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems. In addition, a set of experiments were delivered to consolidate the theoretical concepts.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 42 **In class tests** 2 **Seminars** 2 **Discussions** 2	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.0
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 30 **Preparation for tests** 25 **HomeWorks** 22	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (5)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments (Homeworks)	15	10% (15)	2, 4, 6, 8, 10	LO # 1, 2, 3, 4, and 5
	Seminars	2	10% (10)	Continuous	
	Discussions	2	10% (10)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

<table>
<tr><td colspan="2" align="center">**Delivery Plan (Weekly Syllabus)**
المنهاج الاسبوعي النظري</td></tr>
<tr><td></td><td>**Material Covered**</td></tr>
<tr><td>**Week 1**</td><td>**Structure of solids**: Classification of engineering materials, Structure-property relationship in engineering materials</td></tr>
<tr><td>**Week 2**</td><td>**Structure of solids**: Crystalline and noncrystalline materials, Miller Indices, Crystal planes and directions, Determination of crystal structure using X-rays.</td></tr>
<tr><td>**Week 3**</td><td>**Structure of solids**: Inorganic solids, Silicate structures and their applications. Defects; Point, line and surface defects.</td></tr>
<tr><td>**Week 4**</td><td>**Mechanical properties of materials**: Elastic, Anelastic and Viscoelastic behaviour, Engineering stress and engineering strain relationship, True stress - true strain relationship.</td></tr>
<tr><td>**Week 5**</td><td>**Mechanical properties of materials**: Review of mechanical properties, Plastic deformation by twinning and slip, Movement of dislocations, Critical shear stress, Strengthening mechanism, and Creep.</td></tr>
<tr><td>**Week 6**</td><td>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.**</td></tr>
<tr><td>**Week 7**</td><td>Midterm exam</td></tr>
<tr><td>**Week 8**</td><td>**Electrical and magnetic materials:** Conducting and resistor materials, and their engineering application; Semiconducting materials, their properties and applications; Magnetic materials, Soft and hard magnetic materials and applications.</td></tr>
<tr><td>**Week 9**</td><td>**Electrical and magnetic materials:** Superconductors; Dielectric materials, their properties and applications. Smart materials: Sensors and actuators, piezoelectric, magnetostrictive and electrostrictive materials.</td></tr>
<tr><td>**Week 10**</td><td>**Polymers** – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers.</td></tr>
<tr><td>**Week 11**</td><td>**Polymers** –Urea and Phenol formaldehydes)- Engineering Ceramics – Properties and applications of Al2O3, SiC, Si3N4, PSZ and SIALON –Composites- Classifications- Metal Matrix and FRP - Applications of Composites.</td></tr>
<tr><td>**Week 12**</td><td>**Mechanisms of plastic deformation**, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test lzod and charpy, fatigue and creep failure mechanisms.</td></tr>
<tr><td>**Week 13**</td><td>**Materials selection**: Overview of properties of engineering materials, Selection of materials for different engineering applications.</td></tr>
<tr><td>**Week 14**</td><td>Smart or functional materials underly an important class of materials that are used in a range of applications from smart phones to solar energy.</td></tr>
<tr><td>**Week 15**</td><td>**Materials processing in cermaic and composite**, case studies</td></tr>
<tr><td>**Week 16**</td><td>**Final Exam**</td></tr>
</table>

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	*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	No
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.	No
Websites	N/A	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB 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 DESCRIPTOR
وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	INTERNAL COMBUSTION ENGINES (ICEs)	**Module Delivery**	
Module Type	SUPLEMENT	Theory Lecture Tutorial Lab. Practical Seminar	
Module Code	MECH-308		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	3	**Semester (s) offered**	2
Min number of students	15	**Max number of students**	100
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader	Khalaf I. Hamada	**e-mail**	dr_khalafih@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	PhD
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

<table>
<tr><td colspan="4" align="center">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>Thermodynamics Applied (MECH-209)</td><td>Semester</td><td>2</td></tr>
<tr><td>Co-requisites module</td><td>Heat Transfer MECH-307</td><td>Semester</td><td>2</td></tr>
<tr><td colspan="4" align="center">Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr>
<td>Module Aims
أهداف المادة الدراسية</td>
<td colspan="3">Apply the laws of thermodynamics, conservation of mass, combustion physics and chemistry, fluid flow, heat transfer, and processes that are relevant to internal combustion engines, and develop the techniques and tools necessary for the student to analyze and design Internal Combustion Engines.
Accordingly, this course will provide:
i) Fundamental knowledge on the thermodynamics of internal combustion engines,
ii) Ability to examine the parameters effecting engine performance and improve engine design technology.</td>
</tr>
<tr>
<td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td>
<td colspan="3">On completion of this course students will be able to:
1. Students will learn about conventional as well as advanced concepts being pursued for modern internal combustion engines.
2. Understanding engine energy configurations, a comprehension of energy resource options being considered for use should be made clear.
3. Students will be able to determine engine performance characteristics for these conventional and alternative mobility engines for operation on a variety of fuel alternatives by applying thermochemical principles of energy, material and chemical balances through appropriate modeling.
4. Students will be exposed to various critical environmental drivers relevant to vehicular fuel - engine interfaces.
5. Knowledge gained here will help prepare students for a career in ever important traditional and emerging energy fields of the automotive (i.e. self-propelled) industry.</td>
</tr>
<tr>
<td>Indicative Contents
المحتويات الإرشادية</td>
<td colspan="3">- Historical Overview of IC Engine Development: Evolution of ICEs, pioneers and important milestones,
- ICEs main components:
- Working principles of IC Engine:
- Real ICEs losses relative to the Air-Standard and Fuel-Air Cycles Analysis
- Mixture preparation systems of ICEs:
- IC Engine Testing:
- IC Engine identification based on Combustion Process:
- Real combustion process in IC engines:
- Engine boosting systems:
- Engine Emissions and Air Pollution: Principal Engine Emissions, Sources of Engine/Vehicle Emissions, Health Effects of Air Pollutants, Engine and Vehicle</td>
</tr>
</table>

	Emission Control.
Course Description	This course studies the fundamentals of how the design and operation of internal combustion engines affect their performance, operation, fuel requirements, and environmental impact. Topics include fluid flow, thermodynamics, combustion, heat transfer and friction phenomena, and fuel properties, with reference to engine power, efficiency, and emissions. Students examine the design features and operating characteristics of different types of internal combustion engines: spark-ignition, diesel, stratified-charge, and mixed-cycle engines. Class includes lab experiments in the Heat Engine Laboratory.

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, and demonstrate concepts with appropriate (and where possible practical) examples. Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		79	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
In class lectures	75			
In class tests	4			
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		71	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Library, dorm, home memorizing	41			
Preparation for tests	15			
Home works	15			
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب خلال الفصل		150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	All	LO #1, 2, 3, and 4
	Assignments	4	20% (20)	All	LO # 1, 2, 3, 4 and 5
Summative assessment	**Midterm Exam**	2	20% (20)	7 and 14	LO # 1-3
	Final Exam	3	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to internal combustion engine and IC engine classification
Week 2	Engine classification and engine components
Week 3	Principles of SI and CI engine operation, 2-stroke engines, 4-stroke engines
Week 4	Fuel-Air and Actual Cycles and their Analysis
Week 5	Engine Design and Performance Parameters
Week 6	Engine Design and Performance Parameters
Week 7	Gas exchange systems of ICEs
Week 8	Mixture preparation systems in SI engines
Week 9	Mixture preparation systems in CI engines
Week 10	Combustion in SI engines
Week 11	Combustion in CI Engines
Week 12	IC Engine Testing
Week 13	IC Engine Testing
Week 14	Engine boosting systems: Turbo/Super Charging
Week 15	Engine Emissions & Air Pollution
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Basic Components Assembly of ICEs
Week 2	Basic Components Assembly of ICEs
Week 3	Performance test on 4 – Stroke Diesel Engine with Mechanical Loading Test Rig
Week 4	Performance test on 4 – Stroke Diesel Engine with Mechanical Loading Test Rig
Week 5	Performance test on 4 – Stroke Diesel Engine with Mechanical Loading Test Rig
Week 6	Energy balance sheet test on 4 – Stroke Diesel Engine with Electrical loading test rig

Week 7	Energy balance sheet test on 4 – Stroke Diesel Engine with Electrical loading test rig

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Heywood, J. B. *Internal Combustion Engine Fundamentals*. New York, NY: McGraw-Hill, 1988. ISBN: 9780070286375.	Yes
Recommended Texts	Pulkrabek, W. W. *Engineering fundamentals of the internal combustion engine*. 1st Ed. New Jersey: Prentice Hall, 1997. ISBN: 07458.	Yes
Websites	N/A	

APPENDIX:

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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Fail Group (0 – 49)	**FX –** Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			

Module Title	GAS DYNAMICS	Module Delivery	
Module Type	SUPLEMENT	⬚ Theory ⬚ Lecture ⬚ Lab ⬚ Tutorial ⬚ Practical ⬚ Seminar	
Module Code	MECH-304		
ECTS Credits	5		
SWL (hr/sem)	125		

Module Level		3	Semester (s) offered		1
Administering Department		Mechanical Engineering	College	Engineering	
Module Leader		Dr. Ali Ahmed Gitan	e-mail	aliagitan@tu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor		Seenaa Khudhayer Samnan	e-mail	s.khudhayer@tu.edu.iq	
Peer Reviewer Name			e-mail		
Review Committee Approval		01/06/2023	Version Number	1.0	

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MECH-101	Semester	Level1-Sem2
	MECH-201		Level2-Sem1

	MECH-208		Level2-Sem2
Co-requisites module	None	**Semester**	-

<table>
<tr><td colspan="2" align="center">**Module Aims, Learning Outcomes, Indicative Contents and Brief Description**
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr>
<td>**Module Aims**
أهداف المادة الدراسية</td>
<td>

1. To define the main concepts of compressibile flow.
2. To explaine the physical differences of compressible flows.
3. To Derive the equations of one-dimensional isentropic flow and study flow characteristics in variable area duct.
4. To analyse the two-dimensional flow through the normal and oblique shock waves.
5. To develop a stronge knowlage about frictional flow in constant area duct.
6. To the consider the effect of heat exchange in constant area duct.
7. To have a robust awarenace about some applications such as converging-diverging nozzle, jet engine and fluid machines.
8. To understand the principals and performance of fluid machines.

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<tr>
<td>**Module Learning Outcomes**

مخرجات التعلم للمادة الدراسية</td>
<td>

At the end of this course, the students will be able to:

1. Understand the compressible flow concepts.
2. Solve the problems related to the variable area duct.
3. Analyse the flow across the normal and oblique shock waves.
4. Determine flow properties in Fanno flow.
5. Find out the effect of heating or cooling in Rayliegh flow.
6. Explaine the working principles of compressors, turbines and pumps.

</td>
</tr>
<tr>
<td>**Indicative Contents**
المحتويات الإرشادية</td>
<td>

1. **Basic concepts of compressible flow:** Velocity of sound, Mach number, Physical differences between flow types, The adiabatic steady flow ellipse, Stagnation state, Critical state.
2. **Isentropic Flow in Variable Area Duct**: General feature, Dependence of Mach number on area variation, Mach number possibility at the throat, Critical conditions, Isentropic flow equations, Choking, Isentropic flow in a converging nozzle, Isentropic flow in a converging-diverging nozzle, Impulse function, Important notes on isentropic flow and adiabatic flow.
3. **Shock Waves:** Introduction, Governing equations of normal shock waves, Non-isentropic flow in converging-diverging nozzle, Normal shock wave table, Moving normal shock wave, Shock wave strength, Oblique shock wave.
4. **Constant Area Duct Flow:** Frictional flow in constant area duct, Governing equation of frictional flow, Fanno line, Relations for frictional flow, Frictionless flow with heat transfer in constant area duct, Governing equation of frictionless flow with heat transfer, Rayleigh line.
5. **Turbomachinery:** Axial compressor, Centrifugal compreeor, Gas turbine, Jet engine, Impulse turbine, Reaction turbine, Cavitation and Pumps.

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<tr>
<td>**Course Description**</td>
<td>

The course introduces compressible flow and its constitutive equations and turbomachinery. The physical concepts behind isentropic flows, area-Mach number relation etc will be discussed with practical problems in mind. Properties of shocks and expansions are important parts of this course. flows with heat transfer (Rayleigh line), friction (Fanno line) are also defined in this course. An applications such as compressors, turbines and jet engine are considered as well. The hydraulic macines

</td>
</tr>
</table>

	such as impulse, reaction turbines and pumps are introduced in this course. All the numerical examples will be in SI units.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module will use a range of learning and teaching strategies, including: 1. **Lectures**: To provide students with an overview of the main concepts and principles. 2. **Labs**: To provide students with hands-on experience of devices and instruments. 3. **Assignments and Quizzes**: To provide students with opportunities to apply their knowledge and skills to real-world problems and check their understanding. 4. **Scientific visits and trips**: To provide a real life experience by visiting one of the industrial sites or power stations. 5. **Project**: To test the student knowlage of designing fabrication and testing one model of compressible flow concepts.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
In class	**60**			
Class test	**4**			
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		61	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Project	20			
Preparation for tests, memorizing	16			
Writing reports	15			
Homeworks	10			
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		125		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	4, 6, 10, 15	LO #2, 3,4, 5 and 6
	Project	20	15% (15)	Continuous	LO # 2, 4, and 6
	Lab	15	15% (15)	Continuous	LO # 1 and 6
Summative assessment	**Midterm Exam**	1.5	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

	Delivery Plan (Weekly Syllabus)
	المنهاج الاسبوعي النظري
	Material Covered
Week 1	Basic concepts of compressible flow: Velocity of sound, Mach number, Physical differences between flow types
Week 2	The adiabatic steady flow ellipse, Stagnation state, Critical state,
Week 3	Isentropic Flow in Variable Area Duct: General feature, Dependence of Mach number on area variation, Mach number possibility at the throat. Critical conditions, Choking,
Week 4	Isentropic flow in a converging nozzle, Isentropic flow in a converging-diverging nozzle, Impulse function, Important notes on isentropic flow and adiabatic flow.
Week 5	Shock Waves: Introduction, Governing equations of normal shock waves, Non-isentropic flow in converging-diverging nozzle, Normal shock wave table,
Week 6	Moving normal shock wave, Shock wave strength
Week 7	Midterm
Week 8	Oblique shock wave
Week 9	Constant Area Duct Flow: Frictional flow in constant area duct, Governing equation of frictional flow, Fanno line, Relations for frictional flow
Week 10	Frictionless flow with heat transfer in constant area duct, Governing equation of frictionless flow with heat transfer, Rayleigh line.
Week 11	Turbomachinery: Axial Compressor, Centrifugal compressor.
Week 12	Gas and steam Turbines and Jet Engine
Week 13	Impulse Turbine and Radial Reaction Turbine
Week 14	Axial Reaction turbine and cavitation phenomenon.
Week 15	Pumps
Week 16	Final Exam

	Delivery Plan (Weekly Lab. Syllabus)
	المنهاج الاسبوعي للمختبر
	Material Covered
Week 1	Exp. 1: Wind tunnel (Groupe A)
Week 2	Exp. 1: Wind tunnel (Groupe B)
Week 3	Exp. 1: Wind tunnel (Groupe C)

Week 4	Exp. 1: Wind tunnel (Groupe D)
Week 5	Exp. 1: Wind tunnel (Groupe E)
Week 6	Exp. 2: Pelton turbine (Groupe A)
Week 7	Exp. 2: Pelton turbine (Groupe B)
Week 8	Exp. 2: Pelton turbine (Groupe C)
Week 9	Exp. 2: Pelton turbine (Groupe D)
Week 10	Exp. 3: Pelton turbine (Groupe E)
Week 11	Exp. 3: Centrifugal pump (Groupe A)
Week 12	Exp. 3: Centrifugal pump (Groupe B)
Week 13	Exp. 3: Centrifugal pump (Groupe C)
Week 14	Exp. 3: Centrifugal pump (Groupe D)
Week 15	Exp. 3: Centrifugal pump (Groupe E)
Week 16	Experimental Test

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Compressible fluid flow, Patrick H. Oosthuizen & William E. Carscallen, 1997. 2. Thermal and Hydraulic machines	No
Recommended Texts	1. Gas dynamics, James E. A. John & Theo G. Keith, 2006. 2. مبادئ ديناميك الغازات، د. منذر الدروبي، ١٩٨٠ 3. A text book of hydraulic machines, R. S. Khurmi.	No
Websites		

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Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	MANUFACTURING PROCESSES 2		**Module Delivery**	
Module Type	CORE		Theory Lecture Laboratory Practical Seminar	
Module Code	MECH-305			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	3	**Semester (s) offered**		1
Min number of students	15	**Max number of students**		100
Administering Department	Mechanical Engineering	**College**	Engineering	
Module Leader	Mohammed Salih Ahmed	**e-mail**	Mohammed.Ahmed72@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**		PhD
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	Dr. Farouk M. Mahdi	**e-mail**	Farouk_1959_1996@tu.edu.iq	
Review Committee Approval	01/06/2023	**Version Number**	1.0	

Relation with Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	The main goal of this course is to develop the student's knowledge and introduce him to the importance of metal casting in industry and furnace's types and their advantages and disadvantages. Casting processes with their types which include expandable mold casting and permanent mold casting has been emphasized as a major objective to be taught to students. In addition Welding and forming processes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Explain metal casting which contains, metal casting definition, types of furnaces, Mould casting and types of mould casting 2- Study the welding process which include importance of welding in industry, methods of metal welding advantages and disadvantages of each type of welding. forming processes and machining types were studied as well.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. ● Metal casting (4 hrs) ● Types of furnaces (4 hrs) ● Welding processes (4 hrs) ● Forming processes (6 hrs) ● Mechanical machining (10 hrs)
Course Description	The essential point in this coarse is to give the basics of metal casting, starting with the definition and classification of furnaces, in addition to mold casting with their types. And then focus on studying welding processes and methods of metal forming.

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 and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems. In addition, a set of experiments were delivered to consolidate the theoretical concepts.

<table>
<tr><td colspan="5" align="center">Student Workload (SWL)
الحمل الدراسي للطالب</td></tr>
<tr>
<td>Structured SWL (h/sem)
الحمل الدراسي المنتظم للطالب خلال الفصل

In class lectures   28
In class tests   21
Discussions   15</td>
<td>64</td>
<td>Structured SWL (h/w)
الحمل الدراسي المنتظم للطالب أسبوعيا</td>
<td>4.3</td>
</tr>
<tr>
<td>Unstructured SWL (h/sem)
الحمل الدراسي غير المنتظم للطالب خلال الفصل

Library, dorm, home memorizing 30
Preparation for tests   25
Home Works   6</td>
<td>61</td>
<td>Unstructured SWL (h/w)
الحمل الدراسي غير المنتظم للطالب أسبوعيا</td>
<td>4.1</td>
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<td>Total SWL (h/sem)
الحمل الدراسي الكلي للطالب خلال الفصل</td>
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<table>
<tr><td colspan="6" align="center">Module Evaluation
تقييم المادة الدراسية</td></tr>
<tr>
<td></td>
<td></td>
<td>Time (hr)</td>
<td>Weight (Marks)</td>
<td>Week Due</td>
<td>Relevant Learning Outcome</td>
</tr>
<tr>
<td rowspan="4">Formative assessment</td>
<td>Quizzes</td>
<td>2</td>
<td>10% (10)</td>
<td>4, 9, 12, 14</td>
<td>LO #1, 2, 3, and 4</td>
</tr>
<tr>
<td>Assignments (Home works)</td>
<td>5</td>
<td>10% (10)</td>
<td>2, 4, 6, 9, 11</td>
<td>LO # 1, 2, 3, 4, 5 and 6</td>
</tr>
<tr>
<td>Seminars</td>
<td>4</td>
<td>8% (8)</td>
<td>Continuous</td>
<td></td>
</tr>
<tr>
<td>Discussions</td>
<td>6</td>
<td>12% (12)</td>
<td>Continuous</td>
<td></td>
</tr>
<tr>
<td rowspan="2">Summative assessment</td>
<td>Midterm Exam</td>
<td>2</td>
<td>10% (10)</td>
<td>7</td>
<td>LO # 1-5</td>
</tr>
<tr>
<td>Final Exam</td>
<td>3</td>
<td>50% (50)</td>
<td>16</td>
<td>All</td>
</tr>
<tr>
<td colspan="3">Total assessment</td>
<td>100%
(100 Marks)</td>
<td></td>
<td></td>
</tr>
</table>

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Metal casting
Week 2	Metal casting
Week 3	Types of furnaces
Week 4	Types of furnaces
Week 5	Welding processes
Week 6	Welding processes
Week 7	**Midterm exam**
Week 8	Forming processes
Week 9	Forming processes
Week 10	Forming processes
Week 11	Mechanical machining
Week 12	Mechanical machining
Week 13	Mechanical machining
Week 14	Mechanical machining
Week 15	Mechanical machining
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, Revised Indian, Edition 2014	Yes
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.	No
Websites	N/A	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
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Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		
Module Title	ENGINEERING STATISTICS AND PROBABILITY	**Module Delivery**
Module Type	SUPPORT	
Module Code	MATH-302	**Theory** **Lecture** **Tutorial** **Seminar**
ECTS Credits	3	
SWL (hr/sem)	**75**	

Module Level	3	Semester (s) offered	2
Min number of students	15	**Max number of students**	100
Administering Department	Mech. Engineering	**College**	Engineering
Module Leader	Wadhah Hussein Aldoori	**e-mail**	Wadhah.h.abdulrzzaq@tu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	PhD
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

<table>
<tr><td colspan="4" align="center">**Relation With Other Modules**
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>**Prerequisite module**</td><td>None</td><td>**Semester**</td><td>-</td></tr>
<tr><td>**Co-requisites module**</td><td>None</td><td>**Semester**</td><td>-</td></tr>
<tr><td colspan="4" align="center">**Module Aims, Learning Outcomes, Indicative Contents and Brief Description**
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr><td>**Module Aims**
أهداف المادة الدراسية</td><td colspan="3">1) To provide definition of statistic and give necessary idea.
2) To explain the concept of data collection and representation.
3) To give information about how to make data tabled.
4) To explain the descriptive statistics.
5) To calculate central and variation measurement.
6) To give information about investigative statistics.
7) To explain probability laws.
8) To make analysis and decision.</td></tr>
<tr><td>**Module Learning Outcomes**

مخرجات التعلم للمادة الدراسية</td><td colspan="3">1) Use both conceptual and numerical techniques to solve engineering problems.
2) Analyze and make decision.
3) Understand and use the general idea of statistics of a particle.
4) Understand and use the general ideas probability.
5) Determine the distribution appropriate for any problem.
6) Analyze the data collect from field.
7) Find sample volume.
8) Understand and use the general ideas of hypothesis tests.
9) Apply data analysis by using SPSS program.</td></tr>
<tr><td>**Indicative Contents**
المحتويات الإرشادية</td><td colspan="3">Indicative content includes the following.
● Data collection and data representation. (6 hrs)
● Central and Variation measurements. (6 hrs)
● Principles of probability theory (9 hrs)
● Correlation and Regression (9 hrs)
● Hypotheses and Fitness tests (9 hrs)
● Test of variation, one-way test, two-way test. (9 hrs)</td></tr>
<tr><td>**Course Description**</td><td colspan="3">The course covers the following topics; statistics of applications: Data collection, Data representation, Central measurements, comparisons between central measurements, Variation measurements, comparisons between Variation measurements Sampling and Estimation, Principles of probability theory, Probability Distributions, Correlation and Regression, Hypotheses and Fitness tests, Test of variation, one-way test, Test of variation, two-way test, method of virtual work.</td></tr>
</table>

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل In class lectures 30 In class tests 3 Discussions 15	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل Library, dorm, home memorizing 10 Preparation for tests 10 Homeworks 7	27	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	2, 3, 4, 5, 6, 7	LO #1, 2, 3, and 4
	Assignments (Homeworks)	3	10% (10)	2, 4, 6, 8, 10	LO # 1, 2, 3, 4, 5 and 6
	Discussions	4	12% (20)	Continuous	
Summative assessment	Midterm Exam	2	10% (10)	8	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	General principles, Principles of statistics
Week 2	Data collection, Data representation, Central measurements, Harmonic mean, median.
Week 3	Mode, comparisons between central measurements.
Week 4	Variation measurements, Range, Mean deviation, Deviation, Slandered deviation.
Week 5	Coefficient of variance, comparisons between variance measurements, sequence and measurements
Week 6	Principles of probability theory
Week 7	Sampling and Estimation
Week 8	**Midterm exam**
Week 9	Probability Distributions
Week 10	Probability Distributions
Week 11	Correlation and Regression
Week 12	Hypotheses and Fitness tests
Week 13	Hypotheses and Fitness tests
Week 14	Test of variation, one-way test.
Week 15	Test of variation, two-way test.
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**المدخل إلى الإحصاء"ـد. خاشع محمود الراوي-جامعة الموصل/كلية الزراعة والغابات -1984.**	Yes
Recommended Texts	- مبادئ الإحصاء الهندسي"، د. باسم نزهت السامرائي، د. مثنى جبر، الجامعة التكنولوجية، دار الحكمة للطباعة والنشر، بغداد، 1990	No
	- الأساليب الإحصائية في العلوم الإدارية، تطبيقات باستخدام (spss)"،د. صلاح الدين حسن الهيتي، جامعة مؤتة، دار الوائل للطباعة والنشر، عمان 2004.	Yes
	- مدخل الى علم الإحصاء د. علي محمد الجمعة 2007	No
Websites	N/A	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
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College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	MACHINE DESIGN - I		Module Delivery	
Module Type	CORE		Theory Lecture Tutorial Practical Seminar	
Module Code	MECH-306			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level		3	Semester (s) offered	2
Administering Department		mechanical Engineering	College	Engineering
Module Leader	Hazim Khaleel		e-mail	Hazimkhalil@tu.edu.iq
Module Leader's Acad. Title			Module Leader's Qualification	
Module Tutor	None		e-mail	None
Peer Reviewer Name			e-mail	
Review Committee Approval		01/06/2023	Version Number	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mechanics, strength of Materials	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	This module aims to introduce students to modern mechanical design with the emphasis of machine elements, and analyses these elements based upon extensive application of physics, mathematics and core mechanical engineering principles, including solid mechanics, fluid mechanics, and manufacturing. The student will learn major machine elements such as shafts, couplings, bearings. The student will learn recommendations to make designs more economical, to simplify processes, and to minimize energy use and environmental impact. A project is an integral part of this course and exposes the student to various mechanical design processes and practices.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: 1. Understand and apply appropriate codes of practice and international standards. 2. Demonstrate knowledge and understanding of the mathematics and scientific principles related to the analysis of machine elements, components, and systems. 3. Demonstrate understanding of the structure of materials effects the mechanical properties of those materials 4. Model failure mechanisms in shafts and beams, and calculate fatigue life of mechanical systems 5. Design shafts and shaft couplings, and select appropriate bearings for a mechanical system
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Lecture-30 hours • Tutorial-15 hours • Project supervision-15 hours • Practical Classes and workshops-15 hours • Exams 5 hours • Guided independent study-85 hours • Total: 150 hours
Course Description	Procedures for the practice of mechanical design, Factor of safety and design codes, concepts of axial, radial, circumferential location, basic bearing design, lubrication, static and dynamic theories of failure. Selection of component bought out from specialist suppliers, design and validation of components, selection of materials, manufacturing methods or systems

	concepts that are related to more than component. Use of appropriate software in the design process.
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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 60 **In class tests** 4	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 30 **Preparation for tests** 26 **Homeworks** 30	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	all	LO #1, 2, 3, and 4
	Assignments	6	30% (30)	All	LO # 1, 2, 3, 4, 5 and 6
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to machine design element

Week 2	Review of stresses and strain
Week 3	Review of stresses and strain
Week 4	Factor of safety and design codes
Week 5	Stress concentration
Week 6	Static failure theories
Week 7	Fatigue
Week 8	Fatigue
Week 9	Shafts, keys and couplings, etc.
Week 10	Shafts, keys and couplings, etc.
Week 11	Fits and Tolerances
Week 12	Rolling bearing
Week 13	Rolling bearing
Week 14	Sliding bearing
Week 15	Sliding bearing
Week 16	**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	Mechanical engineering design. Tenth edition Shigley	few

Recommended Texts	− Machine elements. In mechanical. Design. Sixth edition. Robert l. Mott. − Machine design. Childs	No
Websites		

APPENDIX:

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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Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	HEAT TRANSFER (CONVECTION AND RADIATION	Module Delivery
Module Type	CORE	Theory Lecture Tutorial Practical Seminar
Module Code	MECH-307	
ECTS Credits	6	
SWL (hr/sem)	150	

Module Level	3	Semester (s) offered	2
Administering Department	mechanical Engineering	College	Engineering
Module Leader	Dr. Tadahmun A. Yassen	e-mail	tadahmunahmed@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	Ph.D
Module Tutor	None	e-mail	None
Peer Reviewer Name		e-mail	
Review Committee Approval	01/06/2023	Version Number	1.0

<table>
<tr><td colspan="4" align="center">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>MATH-101, MATH-102, MECH-101</td><td>Semester</td><td>- 1,2</td></tr>
<tr><td>Co-requisites module</td><td></td><td>Semester</td><td>-</td></tr>
<tr><td colspan="4" align="center">Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr>
<td>Module Aims
أهداف المادة الدراسية</td>
<td colspan="3">
1. Predict the rate of heat transfer by force convection (conduction with a moving fluid) between a solid and an internal or external fluid flow.
2. Predict the rate of heat transfer by natural convection.
3. Analyze the performance of heat exchangers.
4. Predict the rate of heat transfer by radiation between solids.
</td>
</tr>
<tr>
<td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td>
<td colspan="3">
On completion of this course students will be able to:
1. Understand a thermal system with convection heat transfer, construct a schematic diagram for the system, characterize the geometry and flow conditions, and apply the appropriate convection models:
  i. Boundary layer effects, laminar and turbulent flow.
  ii. Similarity solutions and non-dimensional parameters.
  iii. Reynold's analogy
  v. Use convection correlations for Nusselt Number
2. Understand and model external forced convection heat transfer.
3. Understand and model internal forced convection heat transfer.
4. Understand and model natural convection heat transfer.
5. Understand heat exchangers and carry out analysis to design and selection the type of heat exchangers.
6. Understand key aspects of radiation heat transfer and solve simple problems. Understand radiative properties and models like black body, surface emission and radiosity.
7. Understand and estimate view factors and compute radiation exchange between grey surfaces.
</td>
</tr>
<tr>
<td>Indicative Contents
المحتويات الإرشادية</td>
<td colspan="3">
Indicative content includes the following.
- Principal of force convection (6hrs)
- Force Convection from flat plate (external flow) (6hrs)
- Force convection inside pipes and channels (internal flow) (6hrs)
- Flow across cylinder and sphere (6hrs)
- Flow across bank of tubes(3hrs)
- Natural convection (6hrs)
- Heat exchangers (9hrs)
- Radiation heat transfer (6hrs)
</td>
</tr>
</table>

Course Description	The course considers the analysis of heat transfer by convection using empirical and boundary layer approximations. Both forced and natural convection are considered. Force convection deals in two ways which are external and internal. Natural convection from the solid surfaces is taken into account. The Radiation heat transfer is considered with applications to multi-body radiation. In addition, the properties of thermal radiation, Radiation heat transfer between solids and shape factor is taken in consider

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل In class lectures 60 In class tests 4	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل Library, dorm, home memorizing 34 Prepartion for tests 20 Homeworks 32	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	All	All
	Assignments	5	30% (30)	All	All
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

<table>
<tr><td colspan="2" align="center">Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري</td></tr>
<tr><td></td><td>Material Covered</td></tr>
<tr><td>Week 1</td><td>Force convection, viscos flow, hydrodynamic and thermal boundary layer thickness</td></tr>
<tr><td>Week 2</td><td>Force convection of the laminar flow over flat plate</td></tr>
<tr><td>Week 3</td><td>Relation between fluid friction and heat transfer</td></tr>
<tr><td>Week 4</td><td>Force convection of the turbulent flow over flat plate</td></tr>
<tr><td>Week 5</td><td>Force convection of the laminar and turbulent flow inside tubes and channels</td></tr>
<tr><td>Week 6</td><td>Flow across cylinder and sphere</td></tr>
<tr><td>Week 7</td><td>Midterm exam</td></tr>
<tr><td>Week 8</td><td>Flow across banks of tube</td></tr>
<tr><td>Week 9</td><td>Natural convection</td></tr>
<tr><td>Week 10</td><td>Natural convection</td></tr>
<tr><td>Week 11</td><td>Heat exchanger, Log Mean Temperature Difference</td></tr>
<tr><td>Week 12</td><td>Effectiveness NTU method</td></tr>
<tr><td>Week 13</td><td>Heat exchanger design</td></tr>
<tr><td>Week 14</td><td>Radiation heat transfer, Radiation shape factor</td></tr>
<tr><td>Week 15</td><td>Relation between shape factors, heat exchange between gray bodies</td></tr>
<tr><td>Week 16</td><td>Final Exam</td></tr>
</table>

<table>
<tr><td colspan="2" align="center">Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر</td></tr>
<tr><td></td><td>Material Covered</td></tr>
<tr><td>Week 1</td><td>Force convection in horizontal channel</td></tr>
<tr><td>Week 2</td><td>Force convection in horizontal channel</td></tr>
<tr><td>Week 3</td><td>Force convection in horizontal channel</td></tr>
<tr><td>Week 4</td><td>Natural convection</td></tr>
<tr><td>Week 5</td><td>Natural convection</td></tr>
<tr><td>Week 6</td><td>Solar radiation</td></tr>
<tr><td>Week 7</td><td>Solar radiation</td></tr>
</table>

<table>
<tr><td colspan="3">Learning and Teaching Resources
مصادر التعلم والتدريس</td></tr>
<tr><td></td><td>Text</td><td>Available in the Library?</td></tr>
<tr><td>Required Texts</td><td>Cengel, Y., & Heat, T. M. (2003). A practical approach. Second edi.</td><td>Yes</td></tr>
<tr><td>Recommended Texts</td><td>Holman, J. P. (2010). Heat transfer.
Bergman, T. L., Lavine, A. S., Incropera, F. P., & DeWitt, D. P. (2011). Introduction to heat transfer. John Wiley & Sons.</td><td>No</td></tr>
<tr><td>Websites</td><td></td><td></td></tr>
</table>

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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 DESCRIPTOR

وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Computer Aided Drawing		Module Delivery	
Module Type	Suplement		**Theory** **Lecture** **Practical** **Seminar**	
Module Code	Mech-210			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	2	Semester (s) offered	2	
Min number of students		Max number of students	100	
Administering Department	Mechanical Engineering	College	Engineering	
Module Leader	Omar Jamal Abdulkareem	e-mail	omaralkayalany@tu.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer	Module Leader's Qualification	MSc	
Module Tutor	None	e-mail	None	
Peer Reviewer Name	Dr. Farouk M. Mahdi	e-mail	Farouk_1959_1996@tu.edu.iq	
Review Committee Approval	01/06/2023	Version Number	1.0	

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	1,2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	• Develop skills in the reading, interpretation and production of Mechanical Engineering drawings and diagrammatic illustrations conforming to ASTM and ISO Standards. • To make the students to understand the concepts of I.S. conventions, methods of dimensioning, the title boxes, to draw the machine elements and simple parts. • To make the students to understand and draw assemblies of machine parts and to draw their sectional views
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing the Mechanical Engineering Drawing course, the student will be able to: • Demonstrate a basic understanding of the fundamentals of Part Modeling. • Demonstrate an understanding of the extrude and revolve features. • Demonstrate an understanding of the fundamentals of drawing. • Demonstrate an understanding of Sweep, Loft, Wrap & Additional Features. • Demonstrate an understanding of the fundamentals of Assembly Modeling. • Demonstrate an understanding of top-down assembly modeling • Demonstrate an understanding Rapid Prototyping.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Fundamentals of Part Modeling • Extrude and Revolve Feature • Fundamentals of Drawing • Sweep, Loft, Wrap & Additional Features • Fundamentals of Assembly Modeling
Course Description	In Solidworks course, you will learn the fundamental tools and concepts for the Solidworks engineering and design software. You will learn how to use the Solidworks software to build parametric models of parts and assemblies, and how to make drawings of those parts and assemblies.

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 and

	demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems. In addition, a set of experiments were delivered to consolidate the theoretical concepts.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **15** **In class tests** **4** **Practical** **45**	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 20** **Preparation for tests** **10** **HomeWorks** **6**	36	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments (Homeworks)	5	10% (10)	2, 4, 6, 8, 10	LO # 1, 2, 3, 4, 5 and 6
	Seminars	4	8% (8)	Continuous	
	Discussions	6	12% (12)	Continuous	
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Section A: Basics & Introduction ¬ Graphic User Interface ¬ System requirements
Week 2	¬ Parametric design ¬ Basic part modeling ¬ Feature based modeling ¬ File Management ¬ Managing SolidWorks environment
Week 3	Section B: Sketching with SolidWorks ¬ 2D Sketching ¬ Sketching entities and relations
Week 4	Dimensions ¬ Sketch tool ¬ Mirror, Convert entity ¬ Move & Copy
Week 5	Section C: Part Modeling ¬ Part Modeling ¬ Extrude and Cut extrude ¬ Revolve and Sweep ¬ View toolbar ¬ Creating Reference geometries ¬
Week 6	Fillet and Chamfer ¬ Hole wizard ¬ Calculating weight/mass & other geometric properties ¬ Export / Import of CAD files
Week 7	Midterm exam
Week 8	Section D: Advanced Part Modeling ¬ Adding ribs and draft ¬ Circular and rectangular pattern ¬ Shell and Boss feature ¬
Week 9	Configuration and Design Tables ¬ Material Library & Assigning Material ¬ Library Features & Smart Fasteners ¬ Boolean operations
Week 10	Section E: Assembly Mode ¬ Getting started with Assembly ¬ Inserting components in assembly ¬ Top-Down Assembly ¬ Feature Manager Design tree & Symbols ¬ Hiding components & controlling transparency ¬
Week 11	Sub Assemblies ¬ Using mates in assembly ¬ Use of Smart Fasteners ¬ Bottom -Up Assembly ¬ Interference detection and misalignment of holes ¬ Exploding assemblies and adding explode lines
Week 12	Section F: Generating detail drawings from Model ¬ Drafting overview ¬ Drawing sheets and views ¬ Adding drawing views
Week 13	View settings and drawing properties ¬ Smart Dimensioning ¬ Annotations and Symbols ¬ Sheet Formats and Templates ¬ Ballooning for nomenclature ¬ Adding Bill of Material and tables
Week 14	Section G: Surface Modeling / Sheet Metal ¬ Introduction to surfacing tools ¬ Sweep, Loft, Revolve, Offset etc. ¬ Filleting and trimming ¬ Utilization of Sheet Metal & forming tools
Week 15	Section H: Add-on Modules ¬ Weldment ¬ Core & Cavity ¬ Pipe routing
Week 16	**Final Exam**

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

Required Texts	Engineering Design with SOLIDWORKS 2021: A Step-by-Step Project Based Approach Utilizing 3D Solid Modeling 1st Edition	No
Recommended Texts	Learn SOLIDWORKS: Get up to speed with key concepts and tools to become an accomplished SOLIDWORKS Associate and Professional, 2nd Edition	No
Websites	N/A	

APPENDIX:

<table>
<tr><td colspan="5" align="center">GRADING SCHEME
مخطط الدرجات</td></tr>
<tr><td>Group</td><td>Grade</td><td>التقدير</td><td>Marks (%)</td><td>Definition</td></tr>
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(50 - 100)</td><td>A - Excellent</td><td>امتياز</td><td>90 - 100</td><td>Outstanding Performance</td></tr>
<tr><td>B - Very Good</td><td>جيد جدا</td><td>80 - 89</td><td>Above average with some errors</td></tr>
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<tr><td>D - Satisfactory</td><td>متوسط</td><td>60 - 69</td><td>Fair but with major shortcomings</td></tr>
<tr><td>E - Sufficient</td><td>مقبول</td><td>50 - 59</td><td>Work meets minimum criteria</td></tr>
<tr><td rowspan="2">Fail Group
(0 – 49)</td><td>FX – Fail</td><td>مقبول بقرار</td><td>(45-49)</td><td>More work required but credit awarded</td></tr>
<tr><td>F – Fail</td><td>راسب</td><td>(0-44)</td><td>Considerable amount of work required</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Note:

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			

Module Title	NUMERICAL ANALYSIS	Module Delivery	
Module Type	SUPLEMENT	Theory Lecture Tutorial Practical Seminar	
Module Code	MATH-301		
ECTS Credits	4		
SWL (hr/sem)	100		

Module Level		3	Semester (s) offered		1
Administering Department		Mechanical Engineering	College	Engineering	
Module Leader		Dr. Ibrahim Thamer Nazzal	e-mail	dribrahimthamer@tu.edu.iq	
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	None		e-mail	None	
Peer Reviewer Name		Dr. Tahseen T. Othman	e-mail	@tu.edu.iq	
Review Committee Approval		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, Indicative Contents and Brief Description	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	The aim of the module is to motivate, describe, analyze, and implement numerical methods for problems, including a solution of nonlinear equations; approximation of integrals; numerical interpolation, and solution of differential equations. Different methods are presented for solving such problems on a modern computer, together with their applicability and error analysis. A significant part of the module is devoted to programming these methods. This module also aims to develop skills in programming numerical methods. Through a combination of practical mechanical applications and theoretical knowledge, they will develop an understanding of the numerical techniques used within modern computer packages.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of this module, students will be able to: - explain basic concepts of numerical analysis - Identify the type of analysis suitable for the solution of an engineering problem with their respective advantages and limitations. - Recognize and explain equations governing typical engineering problems. - demonstrate knowledge and critical understanding of the well-established principles within a wide range of basic numerical methods, including iterative methods, interpolation, quadrature, finite difference approximation of initial-value problems for ordinary differential equations (ODEs) - Implement numerical methods using both hand and computer software, and apply them in examples. - Implement numerical methods for different classes of problems using common software packages. - Understand the concept of computer algorithms and programming - Analyze and validate simulated results against benchmarks. - estimate the errors inherent in different numerical methods
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Mathematical Background:

	• System Of Linear Algebraic Equations • Solving nonlinear equations • Curve Fitting • Numerical interpolation • Numerical Integration • Numerical differentiation • Solving Ordinary Differential Equations (initial value problems) • Solving Ordinary Differential Equations (finite difference methods)
Course Description	This course will cover a range of numerical analysis techniques related to matrix problems, solving systems of linear algebraic equations, solving nonlinear equations, Curve Fitting, polynomial approximation and interpolation, numerical integration and differentiation, and ordinary and partial differential equations. All of these numerical problems will be programmed, debugged, and executed.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The learning and teaching strategy is designed to introduce numerical methods and machine learning through theory with work examples carried out by the students. This is carefully delivered through lectures including question and answer sessions, demonstrating captured content, problem-solving, tutorial classes, and project methods with the students conducting a coursework assignment.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 39 **In class tests** 5 **Seminars** 4	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 30 **Prepartion for tests** 10 **Homeworks** 12	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

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
			تقييم المادة الدراسية		
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Seminars	3	12% (12)	Continuous	
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

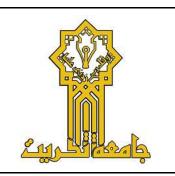|	Material Covered
Week 1	Mathematical Background: - matrix - matrix operations (addition, multiplication,….
Week 2	- Determinant - Matrix inversion
Week 3	System Of Linear Algebraic Equations Gauss Elimination
Week 4	Matrix Inversion The Gauss-Seidel Method
Week 5	Open Methods to Estimate Root. The Newton-Raphson Method The Secant Method
Week 6	Curve Fitting Linear Regression Newton's Divided-Difference Interpolation Polynomials
Week 7	Midterm exam
Week 8	Lagrange Interpolation Polynomials
Week 9	Numerical Integration -The Trapezoidal Rule
Week 10	-Simpson Rules
Week 11	Numerical Differentiation -Richardson Extrapolation
Week 12	Ordinary Differential Equations Euler's Method Modified Euler's Method
Week 13	Runge -Kutta Methods
Week 14	Partial Differential Equations Finite Difference Method for Elliptic Equations
Week 15	Finite Difference method for Parabolic Equations

Week 16	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	Numerical Methods for Engineers. By Stephen Chapra	Yes
Recommended Texts	Numerical Methods for Engineers and Scientists: An Introduction with Applications Using MATLAB by Amos Gilat	No
Websites	http://umich.edu/~elements/5e/lectures/index.html	

APPENDIX:

GRADING SCHEME
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	FX – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
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Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		
Module Title	ENGINEERING MANAGEMENT AND ETHICS	**Module Delivery**
Module Type	CORE	Theory Lecture Seminar
Module Code	MECH-301	
ECTS Credits	4	
SWL (hr/sem)	100	

Module Level	3	**Semester (s) offered**	1
Min number of students	20	**Max number of students**	90
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader	Mohammed Salih Ahmed	**e-mail**	Mohammed.Ahmed72@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	PhD
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Saad Ramadhan Ahmed	**e-mail**	Saadramadhan82@tu.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

<table>
<tr><td colspan="4" align="center">**Relation with Other Modules**
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>**Prerequisite module**</td><td>None</td><td>**Semester**</td><td>2</td></tr>
<tr><td>**Co-requisites module**</td><td>None</td><td>**Semester**</td><td>-</td></tr>
<tr><td colspan="4" align="center">**Module Aims, Learning Outcomes, Indicative Contents and Brief Description**
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr><td>**Module Aims**
أهداف المادة الدراسية</td><td colspan="3">The main goal of this course is to develop the student's knowledge and introduce him to the importance of engineering management and Ethics and its applications.

Concepts of engineering management, the most important applications of operations research in the industrial field, The most important features of industry and modern engineering management.

Teaching the student, the rules of ethics in regulating the general behavior of members of the engineering profession. Teaching the student, the general concept of engineering ethics.

.</td></tr>
<tr><td>**Module Learning Outcomes**

مخرجات التعلم للمادة الدراسية</td><td colspan="3">1) Understand the characteristics of an engineering management.
2) Understand the industrial engineering functions.
3) Recognize the relation between costs, profits and volume of production. In addition, the project management.
4) Learn about linear programing and the methods to solve their problems.</td></tr>
<tr><td>**Indicative Contents**
المحتويات الإرشادية</td><td colspan="3">Indicative content includes the following.

- Concepts of engineering management   (3 hrs)
- Principles and concept of engineering ethics   (3 hrs)
- Industrial engineering functions   (4 hrs)
- The professional life of the engineer and his various Relationships   (3hrs)
- Laws and legislation that regulate professional ethics   (3hrs)
- Economic and technical feasibility studies   (3 hrs)
- Types of productivity   (4 hrs)
- Linear programing   (4 hrs)
- Project management   (3hrs)
- Storage management   (3 hrs)</td></tr>
<tr><td>**Course Description**</td><td colspan="3">The essential point in this coarse is to give the basics of engineering management and ethics, starting with the concepts of engineering</td></tr>
</table>

	management, industrial engineering functions, characteristics of construction, project phases, resource learning technique in addition to economic and technical feasibility studies. And then focus on The relationship between cost, profit and volume of production, project management, operation management and types of productivity .
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 and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems. In addition, a set of experiments were delivered to consolidate the theoretical concepts.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل In class lectures 25 In class tests 5 Seminars 10 Discussions 8	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل Library, dorm, home memorizing 22 Preparation for tests 20 Home Works 10	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	4, 9, 12, 14	LO #1, 2, 3, and 4
	Assignments (Home works)	5	10% (10)	2, 4, 6, 9, 11	LO # 1, 2, 3, 4, 5 and 6
	Seminars	4	8% (8)	Continuous	
	Discussions	6	12% (12)	Continuous	

Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري		
	Material Covered		
Week 1	Concepts of engineering management , The most important features of industry and modern engineering management systems		
Week 2	Principles and concept of engineering ethics, General components of professional ethics.		
Week 3	Industrial engineering functions. Administrative and technological organization of an industrial facility, plan layout, Factors affecting factory layout		
Week 4	Economic and technical feasibility studies, production costs, break-even analysis		
Week 5	The relationship between cost, profit and volume of production, Productivity , Types of productivity		
Week 6	Quality management system and work study. The main steps of a work study, measuring work content and setting standard time. Exercises		
Week 7	Midterm exam		
Week 8	Quality control, operation research, linear programing, graphical method		
Week 9	Linear programing, simplex method, basis theorem, dual model. transportation models		
Week 10	Concept of operation management, scheduling and sequence of operation		
Week 11	Storage management ,Types of storage , Inventory control as a competitive advantage, economic order quantity and project management.		
Week 12	Maintenance and replacement, Reliability, importance of reliability, reliability system		
Week 13	Laws and legislation that regulate public behavior and professional ethics		
Week 14	Location models, Project Management and PERT Technologies , Network diagram rules		
Week 15	**Quality control, types of quality control, Sample examination**		
Week 16	**Final Exam**		

<table>
<tr><th colspan="3">Learning and Teaching Resources
مصادر التعلم والتدريس</th></tr>
<tr><td></td><td>Text</td><td>Available in the Library?</td></tr>
<tr><td>Required Texts</td><td>"قواعد وأخلاقيات ممارسة مهنة الهندسة", الاستاذ المهندس الدكتور نبيل عبد الرزاق جاسم, دار ومكتبة البشائر للطباعة والنشر والتوزيع, بيروت-لبنان, ٢٠١٣.
Industrial and systems engineering, Edited by Adedeji B.Badiru 2014</td><td>Yes</td></tr>
<tr><td>Recommended Texts</td><td>An introduction to Ethics and its Relevance to the Profession of Engineering , Dr. N. Karunakaran</td><td>No</td></tr>
<tr><td>Websites</td><td>N/A</td><td></td></tr>
</table>

APPENDIX:

<table>
<tr><th colspan="5">GRADING SCHEME
مخطط الدرجات</th></tr>
<tr><td>Group</td><td>Grade</td><td>التقدير</td><td>Marks (%)</td><td>Definition</td></tr>
<tr><td rowspan="5">Success Group (50 - 100)</td><td>A - Excellent</td><td>امتياز</td><td>90 - 100</td><td>Outstanding Performance</td></tr>
<tr><td>B - Very Good</td><td>جيد جدا</td><td>80 - 89</td><td>Above average with some errors</td></tr>
<tr><td>C - Good</td><td>جيد</td><td>70 - 79</td><td>Sound work with notable errors</td></tr>
<tr><td>D - Satisfactory</td><td>متوسط</td><td>60 - 69</td><td>Fair but with major shortcomings</td></tr>
<tr><td>E - Sufficient</td><td>مقبول</td><td>50 - 59</td><td>Work meets minimum criteria</td></tr>
</table>

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

MODULE DESCRIPTOR

وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	THEORY OF MACHINES		Module Delivery	
Module Type	CORE		Theory Lecture Tutorial Practical Seminar	
Module Code	MECH-302			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level		3	Semester (s) offered	1
Administering Department		mechanical Engineering	College	Engineering
Module Leader	Dr. AMIR M ALSAMMARRAIE		e-mail	amircraft@tu.edu.iq
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification	Ph.D.
Module Tutor	None		e-mail	None
Peer Reviewer Name	None		e-mail	None
Review Committee Approval		01/06/2023	Version Number	

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ME344, ME234	**Semester**	1,2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	Theory of machines and mechanisms focuses on the study of relative motion between numerous machine components and the forces that act on them. The knowledge of this subject is very essential for an engineer in designing the various parts of a machine. It involves the study of position, displacement, velocity and acceleration of machine parts.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.To identify and enumerate different link based mechanisms with basic understanding of motion 2. To understand and illustrate various power transmission mechanisms using suitable methods 3. To understand and illustrate various power transmission mechanisms using suitable methods 4.Understand a wide variety of learning algorithms. Understand how to evaluate models generated from data. 5.Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Velocity in mechanisms, Acceleration in mechanisms(12 h) • Balancing of rotating masses, Balancing of reciprocating, Friction clutches, Belts, ropes and chain drives (24h) • Toothed gearing, Gear trains(12h) • Gyroscopic coyple and, Percessional motion, Turning moment diagrams and flywheel (12h) • Governors, Cams, Universal joints (Hooks)(18 h)
Course Description	This course aims to defined as that branch of engineering science which deals with the study of relative motion between various elements of a machine and the forces which act on them.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The learning and teaching strategy is designed to: Carefully cover essential materials, programs and modern analytical techniques in lectures Demonstrate concepts with appropriate (and practical where possible) examples Allow students sufficient time to practice the techniques using a large number of carefully selected learning problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل In class lectures 75 In class tests 4	79	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل Library, dorm, home memorizing 36 Prepartion for tests 24 Homeworks 11	71	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Seminars	3	12% (12)	Continuous	
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1,2	Introduction in theory machines
Week 3,4,5	Velocity in mechanisms

Weeks 6,7,8	Acceleration in mechanisms
Weeks 9,10,11	Balancing of rotating masses
Weeks 12,13	Friction clutches
Weeks 14,15	Belts, ropes and chain drives

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: the slider-crank chain mechanism
Week 2	Lab 2: Robe-Belt Friction
Week 3	Lab 3: moment of inertia
Week 4	Lab 4: Cams

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Theory of Machines and Mechanisms, Fifth Edition John J. Uicker, Jr. *Professor Emeritus of Mechanical Engineering*, *University of Wisconsin–Madison*, Gordon R. Pennock, *Associate Professor of Mechanical Engineering*, *Purdue University*, Joseph E. Shigley, *Late Professor Emeritus of Mechanical Engineering*, *The University of Michigan*	Yes
Recommended Texts	**MACHINE DESIGN An Integrated Approach, Robert L. NortonWorcester Polytechnic Institute, Worcester, Massachusetts, Fourth Edition**	No
Websites	https://www.amazon.com/Machine-Design-4th-Robert-Norton/dp/0136123708	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechaniacl Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

<table>
<tr><td colspan="5" align="center">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="2">HEAT TRANSFER CONDUCTION</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="2">CORE</td><td colspan="2" rowspan="4">Theory
Lecture
Tutorial
Practical
Seminar</td></tr>
<tr><td>Module Code</td><td colspan="2">MECH-303</td></tr>
<tr><td>ECTS Credits</td><td colspan="2">6</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="2">150</td></tr>
<tr><td>Module Level</td><td>3</td><td>Semester (s) offered</td><td colspan="2">1</td></tr>
<tr><td>Administering Department</td><td>mechanical Engineering</td><td>College</td><td colspan="2">Engineering</td></tr>
<tr><td>Module Leader</td><td>Dr. Tadahmun A. Yassen</td><td>e-mail</td><td colspan="2">tadahmunahmed@tu.edu.iq</td></tr>
<tr><td>Module Leader's Acad. Title</td><td>Assistant Professor</td><td>Module Leader's Qualification</td><td colspan="2">Ph.D</td></tr>
<tr><td>Module Tutor</td><td>None</td><td>e-mail</td><td colspan="2">None</td></tr>
<tr><td>Peer Reviewer Name</td><td></td><td>e-mail</td><td colspan="2"></td></tr>
<tr><td>Review Committee Approval</td><td>01/06/2023</td><td>Version Number</td><td colspan="2">1.0</td></tr>
</table>

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATH-101, MATH-102, MECH-101	**Semester**	- 1,2
Co-requisites module		**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	This course provides a comprehensive introduction to heat transfer fundamentals and their applications. The course introduces students to the analysis of steady-state and transient one- and multi-dimensional heat conduction.

Module Learning Outcomes
 	
مخرجات التعلم للمادة الدراسية
	On completion of this course students will be able to:
	1. Understand a thermal system, develop the schematic diagram for the system, and apply energy balance and heat transfer models to develop governing equations.
	2. Set up and solve for heat transfer rates as a function of geometry and materials in 1-D conduction using various tools:
	   i. Material properties
	   ii. Fourier's Law
	   iii. Circuit Analogy
	3. Estimate heat transfer from Extended Surfaces, Radial Geometry, and involving Energy Generation.
	4. Construct a transient heat transfer analysis, testing for the lumped capacitance approximation and understanding the assumptions.
	5. Understand the approach for setting up numerical analysis for 2-D conduction heat transfer.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction to heat transfer (6hrs) • One-dimension steady state conduction without heat generation (6hrs) • One-dimension steady state conduction with heat generation (6hrs) • Heat transfer from extended surfaces (9) • Transient one dimension conduction(6hrs) • Two dimensions conduction (9hrs)
Course Description	This is the first course in heat transfer, with an emphasis on understanding the fundamental physics underlying different heat transfer processes, making proper approximations for analytical heat transfer calculations and numerical methods for engineering heat transfer analysis. Topics include: introduction to three modes of heat transfer, thermal resistance network analysis, steady-state conduction, transient conduction, numerical methods for heat conduction

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 60 **In class tests** 4	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 32 **Prepartion for tests** 20 **Homeworks** 34	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	All	All
	Assignments	5	30% (30)	All	All
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Heat transfer
Week 2	Introduction to Heat transfer

Week 3	Steady state one dimension conduction in plane wall without heat generation
Week 4	Steady state one dimension conduction in cylinder and sphere without heat generation
Week 5	Steady state one dimension conduction in plane wall with heat generation
Week 6	Steady state one dimension conduction in cylinder and sphere with heat generation
Week 7	Midterm exam
Week 8	Extended surfaces (Fins), fin general conduction analysis
Week 9	Fin efficiency
Week 10	Fin effectiveness
Week 11	Critical thickness of insulation
Week 12	Steady state two-dimensions conduction, numerical analysis
Week 13	Steady state two-dimensions conduction, numerical analysis
Week 14	Unsteady state conduction, lamped heat capacity system
Week 15	Transient heat flow in a semi-infinite solid
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Temperature measuring instruments calibration
Week 2	Temperature measuring instruments calibration
Week 3	Temperature measuring instruments calibration
Week 4	Thermal conductivity
Week 5	Thermal conductivity
Week 6	Contact resistanc
Week 7	Contact resistanc

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Cengel, Y., & Heat, T. M. (2003). A practical approach. *Second edi*.	Yes

Recommended Texts	Holman, J. P. (2010). Heat transfer. Bergman, T. L., Lavine, A. S., Incropera, F. P., & DeWitt, D. P. (2011). *Introduction to heat transfer*. John Wiley & Sons.	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
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Fail Group (0 – 49)	**FX –** Fail	مقبول بقرار	(45-49)	More work required but credit awarded
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Note:	

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MODULE DESCRIPTOR

وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		
Module Title	APPLIED THERMODYNAMICS	**Module Delivery**
Module Type	CORE	Theory
Module Code	MECH-209	Lecture
ECTS Credits	6	Tutorial
SWL (hr/sem)	150	Practical
		Seminar

Module Level	2	Semester (s) offered	2
Administering Department	mechanical Engineering	**College**	Engineering
Module Leader	Dr. Hameed Jassim Khalaf	**e-mail**	hameed.j.khalaf@tu.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.D
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

<table>
<tr><td colspan="4" align="center">**Relation With Other Modules**
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>**Prerequisite module**</td><td>MECH-304, MECH-308, MECH-406</td><td>**Semester**</td><td>- 1,2</td></tr>
<tr><td>**Co-requisites module**</td><td></td><td>**Semester**</td><td>-</td></tr>
<tr><td colspan="4" align="center">**Module Aims, Learning Outcomes, Indicative Contents and Brief Description**
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr><td>**Module Aims**
أهداف المادة الدراسية</td><td colspan="3">-To cover the *second-law of thermodynamics statements*
-To present a wealth of real-world engineering examples to give students a feel for how thermodynamics is applied in engineering practice.
-To develop an intuitive understanding of thermodynamics by emphasizing the physics and physical arguments</td></tr>
<tr><td>**Module Learning Outcomes**

مخرجات التعلم للمادة الدراسية</td><td colspan="3">On completion of this course students will be able to:
1. Understand the statements of second-law of thermodynamics, Clausius Inequality, PMM1, Heat reservoir, heat source ,heat sink.
2. Set up and solve for engineering thermal systems according to second-law of thermodynamics, Carnot cycle, Carnot theorem , corollary of Carnot's theorem, Heat engine cycle, thermal efficiency,
3. Understand the coefficient of performance of reversed heat engine(Refrigerators and heat pumps).
4. Understand the entropy property, reversible, irreversible cycles.
5. Steam and air-standard cycles
6. Chemical reaction, air-fuel ratio, combustion, main and secondary products</td></tr>
<tr><td>**Indicative Contents**
المحتويات الإرشادية</td><td colspan="3">Indicative content includes the following.
• Introduction to second-law of thermodynamics (6hrs)
• The second- law of thermodynamics , Carnot cycle, heat engine cycle, reversed heat engine cycle, entropy , are introduced (6hrs)
• A general understanding of second-law applications, ideal Rankin cycle, gas power cycle, air-standard cycles. (6hrs)
• Exposes students to some exciting real-world applications of thermodynamics early in this course, and helps them establish a sense of the monetary value of energy(9hrs)</td></tr>
<tr><td>**Course Description**</td><td colspan="3">Thermodynamics is an exciting and fascinating subject that deals with energy, which is essential for sustenance of life, and thermodynamics has long been an essential part of engineering curricula all of the world. It has a broad application area ranging from microscopic organisms to common household appliances, transportation vehicles, power generation systems, this course contains sufficient material for fundamental and principles of thermodynamics.</td></tr>
<tr><td colspan="4"></td></tr>
</table>

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 59 **In class tests** 2 **Final Examine** 3	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 36 **Preparation for tests** 25 **Homeworks** 25	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	All	All
	Assignments	5	30% (30)	All	All
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري
	Material Covered
Week 1	Second-law of thermodynamics, introduction, statement of second-law of thermodynamics, Kelvin-Planck statements, Clausius statement, definition of: heat reservoir, heat source, heat sink
Week 2	Cycle efficiency of a heat engine or thermal efficiency, Carnot cycle, Carnot theorem
Week 3	Corollary of Carnot's theorem, coefficient of performance for Refrigerators and heat pumps, the thermodynamic temperature scale.
Week 4	Entropy, introduction, definition of entropy, Inequality of Clausius ,increase of entropy principle
Week 5	Entropy change for a closed system, general case for change of entropy of a gas, heating a gas at constant volume, heating a gas at constant pressure, reversible adiabatic process, polytropic process.
Week 6	Steam cycle, ideal Rankin cycle, first law analysis of vapor power cycle, steady- flow energy equations of power plant units, Pump, Boiler, Turbine, Condenser.
Week 7	Midterm exam
Week 8	Gas power cycles, definition of Air-standard efficiency, air- standard cycles, Carnot cycle.
Week 9	Constant-volume cycle or Otto cycle, constant pressure cycle or Diesel cycle,
Week 10	Dual combustion cycle, Brayton cycle or Joule cycle.
Week 11	Tutorial sheets for example solutions
Week 12	Gas mixtures, introduction, composition of a gas mixtures mass and mole fractions.
Week 13	P-V-T behavior of gas mixtures: Ideal and Real gases, Dalton's law of additive pressures, Amagat's law of additive volumes ,properties of gas mixtures: Ideal gases
Week 14	Chemical Reactions, fuel and combustion, theoretical and actual combustion processes, enthalpy of formation and enthalpy of combustion, first-law analysis of reacting systems, adiabatic flame temperature
Week 15	Entropy change of reacting systems, second-law analysis of reacting systems.
Week 16	**Final Exam**

<table>
<tr><td colspan="2">Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر</td></tr>
<tr><td></td><td>Material Covered</td></tr>
<tr><td>Week 1</td><td>Bolye's Law</td></tr>
<tr><td>Week 2</td><td>Measuring the ratio between the two specific heats(γ)</td></tr>
<tr><td>Week 3</td><td>The relationship between saturation pressure and temperature of water vapor</td></tr>
<tr><td>Week 4</td><td>Discussions</td></tr>
<tr><td>Week 5</td><td>Specific heats of solids</td></tr>
<tr><td>Week 6</td><td>Heat pump</td></tr>
<tr><td>Week 7</td><td>Discussions</td></tr>
</table>

	Learning and Teaching Resources مصادر التعلم والتدريس	
	Text	**Available in the Library?**
Required Texts	Cengel, Y., & Thermodynamics: An engineering Approach, *Seven edi*.	Yes
Recommended Texts	Applied thermodynamics for engineering technologists, third edi, by T.D.EASTOP	Yes
Websites		

APPENDIX:

	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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المـادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	FLUİD MECHANİCS 2	Module Delivery	
Module Type	CORE	Theory Lecture Lab Tutorial Practical Seminar	
Module Code	MECH-208		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level		2	Semester (s) offered	2
Administering Department		Mechanical Engineering	College	Engineering
Module Leader	Dr. Thamer K. Salem Dr. Ibrahim T. Nazzal		e-mail	thamersa1974@tu.edu.iq dribrahimthamer@tu.edu.iq
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Seenaa Khudhayer Salman		e-mail	s.khudhayer@tu.edu.iq
Peer Reviewer Name			e-mail	
Review Committee Approval		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, Indicative Contents and Brief Description	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	The course objective is to provide students with the fundamental physical and analytical principles of Incompressible Fluid Mechanics through the understanding of the: conservation of mass, conservation of energy, and the conservation of momentum and basic equations. in addition, to studying different topics such as Dimensional Analysis, Dynamic Similarity, and Viscous effects in Flow Resistance. It is expected that the students will gain a fundamental physical and mathematical understanding of this topic rather than memorizing the equations and situations. By this, it is implied that the student will be able to correctly apply the course content to new situations so as to evaluate potential industrial applications of fluid theory through both physical induction and mathematical analysis/computation. Such inductive and analytical reasoning will be taught through classroom examples and homework, while it will be tested on examinations. In addition, the Statement of the importance of studying fluids in practical life with the derivation of mathematical formulas that govern the movement of fluids. As a result of this study, the scientific concept and consolidation can be refined the scientific material properly by conducting continuous examinations and activating the role of the student not in obtaining the degree. Then, the understanding and benefiting from this subject to the fullest extent in daily life for different scopes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course, the students should be able to: 1. Be familiar with the terminology associated with fluid mechanics. 2. Explain and describe how fluid shear stresses resist forces such as gravity and momentum. 3. Be able to determine pressure drop for pipe systems and choose appropriate pumps and turbines depending on the application. 4. Ability to derive the equation for viscous flow, including laminar flow and turbulent flow. 5. Interpret experimental and test results and present these in an appropriate engineering report format. 6. Collaborate with others in a team project environment to conduct engineering investigations and produce engineering reports. 7. To understand the general principles of Incompressible Fluid Mechanics in various applications. 8. To understand incompressible and compressible flow 9. To understand flow through pipes and open channel. 10. To understand the Viscous effects on Flow Resistance. 11. To improve the student skills in fluid mechanics design in Dimensional Analysis And Dynamic Similarity

	12. Adjusting the practical aspects of this course-2 "Incompressible Fluid Mechanics" through laboratory sessions (practical tests).
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** • Reynolds transport theorem (RTT). • Continuity equation, Energy equation, and Bernoulli equation. • Static, Dynamic, and Stagnation Pressures. • Fixing and moving vanes. • The moment theory for propeller. • Dimensions and Units and Buckingham π- Theorem or PI Theorem. • Similarity Principles and Dynamic Simulated. • Nondimensional Parameters and Simulation. • The steady flow between parallel plate. • Laminar and Turbulent flow in pipes. • Entrance Region And Fully Developed. • Minor and Major Losses.
Course Description	The course begins with the material properties of fluids. This is followed by studying fluid statics including pressure measurement, hydrostatics and buoyancy. Then studying the principles of fluid motion including mass conservation (the continuity equation) and energy conservation (Bernoulli's equation). This is followed by sections on the energy equation and flow of viscose fluid applied to a range of problems in mechanical engineering, including steady flow in pipes, design of pump and turbine-pipeline systems …etc. Next, this course description provides a necessary summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve. Also, the demonstrates whether he has made the most of the available learning opportunities. besides, It should be linked to the program description. In addition, this course is provided to engineering students with basic skills in fluid mechanics. It provides a clear and thorough demonstration of the theory and application of hydrodynamics equations. Among the main concepts that are covered in this course are pressure, velocity, discharge of flow, laminar and turbulent flow.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم
Strategies	The module will use a range of learning and teaching strategies, including: - **Lectures**: To provide students with an overview of the main concepts of the Incompressible Fluid Mechanics field. this can be achieved by giving lectures, Reading methodological and source books and viewing some websites (self-learning), and Discussion in the classroom. - **Labs**: To provide students with hands-on experience of fluid applications by testing the fluid devices practically. - **Assignments and Quizzes:** To provide students with opportunities to apply their knowledge and skills to real-world problems and check their understanding by achieving the Monthly and final exams, Short tests and participation in the classroom, Submission of scientific and theoretical reports, and the students' performance in the Laboratory.

Student Workload (SWL)				
الحمل الدراسي للطالب				
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
In class lectures	**30**			
In class tests	**4**			
Discussions	**15**			
Laboratory hours	**15**			
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Library, dorm, home memorizing	**40**			
Preparation for tests	**24**			
HomeWorks	**22**			
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		**150**		

Module Evaluation					
تقييم المادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	2, 4, 6, 10	LO #1, 3, 5 and 6
	Assignments	2	15% (15)	3, 5, 13, 14	LO # 2, 4, 7 and 8
	Lab	14	15% (15)	Continuous	
Summative assessment	**Midterm Exam**	1.5	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
Material Covered	
Week 1	Fluid flow concept and Basic equations
Week 2	Reynolds transport theorem (RTT)
Week 3	Static, Dynamic, and Stagnation Pressures.
Week 4	Fixing and moving vanes and the moment theory for the propeller.
Week 5	Dimensional Analysis And Dynamic Similarity
Week 6	Dimensions and Units and Buckingham π- Theorem or PI Theorem.
Week 7	**Midterm**
Week 8	Similarity Principles and Dynamic Simulated.
Week 9	Nondimensional Parameters and Simulation.
Week 10	Viscous Effects and Flow Resistance
Week 11	The steady flow between parallel plates.
Week 12	Laminar and Turbulent flow in pipes.
Week 13	Entrance Region And Fully Developed.
Week 14	Minor and Major Losses in pipes.
Week 15	Pipeline analysis
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
المنهاج الاسبوعي للمختبر	
Material Covered	
Week 1	Lab **1**: Bernoulli equation (Group A)
Week 2	Lab 2: Bernoulli equation (Group B)
Week 3	Lab 3: Bernoulli equation (Group C)
Week 4	Lab 4: Bernoulli equation (Group D)
Week 5	**Midterm exam of Lab tests**
Week 6	Lab **5**: Venturi Gauge Experiment (Group A)
Week 7	Lab 6: Venturi Gauge Experiment (Group B)
Week 8	Lab **7**: Venturi Gauge Experiment (Group C)
Week 9	Lab 8: Venturi Gauge Experiment (Group D)
Week 10	Lab **9**: Fluid jet Experiment or Extrusion blow (Group A)
Week 11	Lab 10: Fluid jet Experiment or Extrusion blow (Group B)

Week 12	Lab 11: Fluid jet Experiment or Extrusion blow (Group C)
Week 13	Lab 12: Fluid jet Experiment or Extrusion blow (Group D)
Week 14	**Final Exam of Lab tests**

	Learning and Teaching Resources مصادر التعلم والتدريس	
	Text	**Available in the Library?**
Required Texts	Fluid Mechanics Fundamentals and Applications, Yunus A. Cengel, John M. Cimbala.	No
Recommended Texts	1-Fluid Mechanics-Victor Lyle Streeter 2-FLUID MECHANICS WITH ENGINEERING APPLICATIONS BY ROBERT L DAUGHERTY	-
Websites	1.Fundamentals of Fluid Mechanics, Munson,Young, Okiishi. 2. Introduction to Fluid Mechanics, Fox, and McDonald. 3.https://www.youtube.com/watch?v=fa0zHI6nLUo&list=PLbMVogVj5nJTZJHsH6uLCO00I-ffGyBEm	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB 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 DESCRIPTOR
وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	STRENGTH OF MATERIAL I	**Module Delivery**	
Module Type	CORE	Theory Lecture Tutorial Practical Seminar	
Module Code	MECH-207		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	2	**Semester (s) offered**	1, 2
Administering Department	Mechanical Engineering	**College**	Engineeeing
Module Leader	Dr. Tahseen Taha	**e-mail**	tahseentaha@tu.edu.iq
Module Leader's Acad. Title	Ass. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr	**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MECH-203	**Semester**	1,2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	Enable students to develop a comprehensive understanding of the methodology of solving strength of material problems
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Interpret and analyse the stress and strain in simple structures. 2. Apply the engineering Mechanics concepts for solving beams problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Undergraduate Review (4 hrs) • Fundamentals of (16 hrs) • (20 hrs) • (10 hrs) • (6 hrs)
Course Description	This course aims to establish fundamental knowledge of Strength of Materials. Presentation of the course starts by introducing simple stress and simple strain utilizes it to solve problems in beams and columns and rivets.

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, and demonstrate concepts with appropriate (and where possible practical)

	examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 56 **In class tests** 4 **Seminars** 4	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 40 **Preparation for tests** 30 **Homeworks** 16	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المـادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Seminars	3	12% (12)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Deflection of beams-Double integration method**
Week 2	**Moment- area method**
Week 3	**Combined stresses - Eccentrically loaded members**
Week 4	**Stress at a point – (Analytical)**
Week 5	**Stress at a point – (Graphical (Mohr̓s)method)**

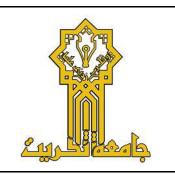| Week 9	Pressure Vessels
Week 10	Riveted joints
Week 11	Riveted joints
Week 12	Welded joints
Week 13	columns Euler's formula for long columns
Week 14	Short and intermediate columns
Week 15	Dynamic loading and Impact loading
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Impact Test
Week 2	Lab 2: Creep test
Week 3	Lab 3: Fatigue Test

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Strength of Materials by Ferdinand L. Singer, Andrew Pytet	Yes
Recommended Texts	Mechanics of Materials by E.J. Hearn	No
Websites	http://	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:	

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

<table>
<tr><td colspan="4" align="center">**Module Information**
معلومات المادة الدراسية</td></tr>
<tr><td>**Module Title**</td><td>ENGINEERING MECHANICS- RIGID BODY DYNAMICS</td><td colspan="2">**Module Delivery**</td></tr>
<tr><td>**Module Type**</td><td>CORE</td><td colspan="2" rowspan="4">**Theory**
Lecture
Tutorial
Practical
Seminar</td></tr>
<tr><td>**Module Code**</td><td>MECH-206</td></tr>
<tr><td>**ECTS Credits**</td><td>6</td></tr>
<tr><td>**SWL (hr/sem)**</td><td>150</td></tr>
<tr><td>**Module Level**</td><td>2</td><td>**Semester (s) offered**</td><td>2</td></tr>
<tr><td>**Administering Department**</td><td>Mechanical Engineering</td><td>**College**</td><td>Engineering</td></tr>
<tr><td>**Module Leader**</td><td></td><td>**e-mail**</td><td></td></tr>
<tr><td>**Module Leader's Acad. Title**</td><td></td><td>**Module Leader's Qualification**</td><td></td></tr>
<tr><td>**Module Tutor**</td><td>None</td><td>**e-mail**</td><td>None</td></tr>
<tr><td>**Peer Reviewer Name**</td><td></td><td>**e-mail**</td><td></td></tr>
<tr><td>**Review Committee Approval**</td><td>20/05/2023</td><td>**Version Number**</td><td>1.0</td></tr>
</table>

<table>
<tr><td colspan="4">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>(ENG-102) Engineering Mechanics-Static</td><td>Semester</td><td>1</td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td>-</td></tr>
</table>

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	1. Introducing the basic principles of engineering mechanics- dynamics. 2. Introducing the basic analysis methods of the rigid body dynamics. 3. Analyzing the patterns and relationships of the given problems with practical examples. 4. Strengthen the basic mechanical sense of the student. 5. Strengthen the utilization of the mathematical tools in the study subjects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: 1. Prepare and understand engineering mechanics – rigid body dynamics. 2. Identify various problems and classify them in order to project the correct solution method. 3. Use the principles of differential equations. 4. Use of the correct tools for solving different examples. 5. Prepare the students for the next subject of rigid body dynamics.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Kinematics of rigid bodies • Absolute motion • Relative motion – Velocity • Relative motion – Acceleration • Kinetics of rigid bodies • General equations of motion • Translation • Fixed-Axis rotation • General motion • Work and energy • Impulse and momentum
Course Description	In this course, the students will be introduced to the fundamentals of Dynamics of Engineering Mechanics. The topics will cover a wide range of applications that, collectively, form building blocks of the dynamics world for an everyday mechanical engineer. Typically, the course starts with the behavior and properties of rigid body dynamics and the fundamental relationships of distance, velocity, and acceleration. There is a broad spectrum to cover to accommodate most of the applications in more than one coordinate system. The analysis of the rigid body motion depends on the

	background of the particle dynamics.

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 60 **In class tests** 3	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 32 **Preparation for tests** 25 **Homeworks** 20	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	58.
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	All	LO #1, 2, 3, and 4
	Assignments	6	30% (30)	All	LO # 1, 2, 3, 4, 5 and 6
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Kinematics of rigid body – Translation

Week 2	Kinematics of rigid body – Rotation
Week 3	Kinematics of rigid body – Relative velocity
Week 4	Kinematics of rigid body – Relative velocity
Week 5	Kinematics of rigid body – Relative acceleration
Week 6	Kinematics of rigid body – Relative acceleration
Week 7	Midterm
Week 8	Kinetics of Rigid body – Translation
Week 9	Kinetics of Rigid body – Fixed axis rotation
Week 10	Kinetics of Rigid body – Fixed axis rotation
Week 11	Kinetics of Rigid body – General motion
Week 12	Kinetics of particles – Work and Energy
Week 13	Kinetics of particles – Work and Energy
Week 14	Kinetics of particles – Impulse and momentum
Week 15	Kinetics of particles – Impulse and momentum
Week 16	**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 Mechanics: Dynamics 6th edition, by Meriam, J. L., Kraige, L. G. (2006)	Yes
Recommended Texts	Engineering Mechanics: Dynamics, by R. C. Hibbeler 2004.	No
Websites	https://www.engineer4free.com/dynamics.html	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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Ministry of Higher Education and
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University of Tikrit
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Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

<table>
<tr><td colspan="4" align="center">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td>ENGLISH II</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td>SUPLEMENT</td><td colspan="2" rowspan="5">Theory
Lecture
Tutorial
Project
Seminar</td></tr>
<tr><td>Module Code</td><td>HUMN -203</td></tr>
<tr><td>ECTS Credits</td><td>2</td></tr>
<tr><td>SWL (hr/sem)</td><td>50</td></tr>
<tr><td>Module Level</td><td>2</td><td>Semester (s) offered</td><td>2</td></tr>
<tr><td>Min number of students</td><td>15</td><td>Max number of students</td><td>100</td></tr>
<tr><td>Administering Department</td><td>Mechanical Engineering</td><td>College</td><td>Engineering</td></tr>
<tr><td>Module Leader</td><td>Thamir Kh. Ibrahim</td><td>e-mail</td><td></td></tr>
<tr><td>Module Leader's Acad. Title</td><td>Professor</td><td>Module Leader's Qualification</td><td>PhD</td></tr>
<tr><td>Module Tutor</td><td>Asst. Prof. Ahmed S. Abdullah</td><td>e-mail</td><td>Ahmedsubhi1981@tu.edu .iq</td></tr>
<tr><td>Peer Reviewer Name</td><td></td><td>e-mail</td><td></td></tr>
<tr><td>Review Committee Approval</td><td>01/06/2023</td><td>Version Number</td><td>1.0</td></tr>
</table>

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	1,2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	Develop the ability/skill needed to earn a job and develop his/her critical thinking skills to work, develop and communicate.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course, the students should be able to: • learn how to make job applications and which recruitment procedures they must go through in the process • acquire the special terminology used in job applications and recruitment procedures • learn how to design a letter of application and CV • have a clear idea about how to prepare for an interview and how to behave during an interview • become familiar with the methods of writing a "letter of intent" ("statement of purpose") when applying for academic studies • have an idea about the "letter of recommendation" that they will need when applying for an academic program after completing their university education • gain an understanding of presentation techniques • become familiar with the basic principles of "Paragraph Writing" • learn and practise the key concepts of paragraph writing such as Topic Sentence, Supporting Sentences, Concluding Sentence, Unity and Coherence • gain insight into the essential principles of "Essay Writing"
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Job applications and which recruitment procedures (6 hrs) • Learn how to design a letter of application and CV and how to prepare for an interview and how to behave during an interview (8 hr) • Presentation techniques (6 hrs) • Paragraph Writing (10 hrs)
Course Description	You will also develop the business communication skills required for anyone in the global economy. This includes topics like delivering presentations,

	writing emails, or speaking in meetings. This gives you the ability to communicate across departments with a strong ability in reading, writing, speaking, and listening.
	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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 30 **In class tests** 3	30	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2.0
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 10 **Preparation for tests** 5 **HomeWorks** 2	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.0
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Seminars	3	12% (12)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered	
Week 1	– Describing technical functions and applications – Explaining how technology works – Emphasizing technical advantages	
Week 2		
Week 3		
Week 4	– Describing specific materials – Discussing quality issues – Describing component shapes and features	
Week 5		
Week 6		
Week 7	Midterm exam	
Week 8	– Explaining and assessing manufacturing techniques – Working with drawings – Describing design phases and procedures	
Week 9		
Week 10		
Week 11	– Discussing repairs and maintenance – Assessing feasibility – Describing improvements and redesigns	
Week 12		
Week 13		
Week 14	– Resolving design problems – Describing types of technical problem – Assessing and interpreting faults	
Week 15		
Week 16	**Final Exam**	

	Learning and Teaching Resources مصادر التعلم والتدريس	
	Text	**Available in the Library?**
Required Texts	Beer, D. & McMurrey, D. 2004, A Guide to Writing as an Engineer (2nd ed), New York: Wiley	No
Recommended Texts	Borowick, Jerome N., 2002, Technical Communication and its Applications (2nd ed), New Jersey: Prentice-Hall, Inc.	No
Websites	http://umich.edu/~elements/5e/lectures/index.html	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المـادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	FLUİD MECHANİCS **1**	**Module Delivery**	
Module Type	CORE	Theory Lecture Lab Tutorial Practical Seminar	
Module Code	MECH-201		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	2	**Semester (s) offered**	1
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader	Dr. Thamer K. Salem Dr. Ibrahim T. Nazzal	**e-mail**	thamersa1974@tu.edu.iq dribrahimthamer@tu.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Seenaa Khudhayer Salman	**e-mail**	s.khudhayer@tu.edu.iq
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

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<tr>
<td colspan="4" align="center">**Relation With Other Modules**
العلاقة مع المواد الدراسية الأخرى</td>
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<tr>
<td>**Prerequisite module**</td>
<td>None</td>
<td>**Semester**</td>
<td>-</td>
</tr>
<tr>
<td>**Co-requisites module**</td>
<td>None</td>
<td>**Semester**</td>
<td>-</td>
</tr>
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Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	The course objective is to provide students with the fundamental physical and analytical principles of fluid mechanics through the understanding of the: conservation of mass, conservation of energy, and the conservation of momentum equations. It is expected that the students will gain a fundamental physical and mathematical understanding of this topic rather than memorizing the equations and situations. By this, it is implied that the student will be able to correctly apply the course content to new situations so as to evaluate potential industrial applications of fluid theory through both physical induction and mathematical analysis/computation. Such inductive and analytical reasoning will be taught through classroom examples and homework, while it will be tested on examinations. In addition, the Statement of the importance of studying fluids in practical life with the derivation of mathematical formulas that govern the movement of fluids. As a result of this study, the scientific concept and consolidation can be refined the scientific material properly by conducting continuous examinations and activating the role of the student not in obtaining the degree. Then, the understanding and benefiting from this subject to the fullest extent in daily life for different scopes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course, the students should be able to: 1. Be familiar with the terminology associated with fluid mechanics. 2. Be able to use fluid properties correctly to solve problems. 3. Explain and describe how fluid shear stresses resist forces such as gravity and momentum. 4. Understand the principles of flow rates and velocity measurement. 5. Interpret experimental and test results and present these in an appropriate engineering report format. 6. Collaborate with others in a team project environment to conduct engineering investigations and produce engineering reports. 7. To understand the general principles of fluid mechanics in various applications. 8. To understand the basic concepts of statics and fluid dynamics and their various engineering applications with calculations of fluid forces on submerged and floating surfaces, as well as applications related to fluid flow. 9. Choosing the appropriate control volume to solve the fluid mechanics equations 10. Determine whether the flow is stable or unstable, regular or irregular, laminar or turbulent 11. Adjusting the practical aspects of this course-1 "Principles of Fluid Mechanics" through laboratory sessions (practical tests).

Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** • Introduction of Fluid Mechanics Principles. • Application Areas of Fluid Mechanics. • Fluid Properties. • Classification Of Fluid Flows. • Units and Scales of Pressure Measurement Fluid Properties. • Pressure Variation in Static Fluid. • Measurement of Pressure. • Hydrostatic Forces on Plane Surfaces and Curved Surface. • The centroid and the centroidal moments of inertia. • Buoyancy Force. • Stability of Floating and Submerged Bodies. • Determination of Rotational Stability of Floating Objects. • Fluids In Rigid-Body Motion. • Rotation in a Cylindrical Container.
Course Description	The course begins with the material properties of fluids. This is followed by studying fluid statics including pressure measurement, hydrostatics and buoyancy. Then studying the principles of fluid motion including mass conservation (the continuity equation) and energy conservation (Bernoulli's equation). Next, this course description provides a necessary summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve. Also, the demonstrates whether he has made the most of the available learning opportunities. besides, It should be linked to the program description. In addition, this course is provided to engineering students with basic skills in fluid mechanics. It provides a clear and thorough demonstration of the theory and application of hydrodynamics equations. Among the main concepts that are covered in this course are pressure, velocity, discharge of flow, laminar and turbulent flow.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم
Strategies	The module will use a range of learning and teaching strategies, including: - **Lectures**: To provide students with an overview of the main concepts and principles in the fluid mechanics field. this can be achieved by giving lectures, Reading methodological and source books and viewing some websites (self-learning), and Discussion in the classroom. - **Labs**: To provide students with hands-on experience of fluid applications by testing the fluid devices practically. - **Assignments and Quizzes:** To provide students with opportunities to apply their knowledge and skills to real-world problems and check their understanding by achieving the Monthly and final exams, Short tests and participation in the classroom, Submission of scientific and theoretical reports, and the students' performance in the Laboratory.

Student Workload (SWL)				
الحمل الدراسي للطالب				
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
In class lectures 30 **In class tests** 4 **Discussions** 15 **Laboratory hours** 15				
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Library, dorm, home memorizing 30 **Preparation for tests** 25 **HomeWorks** 6				
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		**125**		

Module Evaluation					
تقييم المادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	2, 4, 6, 10	LO #1, 3, 5 and 6
	Assignments	2	15% (15)	3, 5, 13, 14	LO # 2, 4, 7 and 8
	Lab	14	15% (15)	Continuous	
Summative assessment	**Midterm Exam**	1.5	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction of Fluid Mechanics Principles
Week 2	Application Areas of Fluid Mechanics.
Week 3	Classification Of Fluid Flows.
Week 4	Pressure Variation in Static Fluid.
Week 5	Fluids at rest stat and pressure applications
Week 6	Fluids at rest stat and pressure applications
Week 7	**Midterm**
Week 8	Forces on submerged bodies and surfaces
Week 9	Fluid acceleration and their relative motion
Week 10	Buoyancy Force
Week 11	Stability of Floating and Submerged Bodies.
Week 12	Introduction to fluid In Rigid-Body Motion
Week 13	Introduction to fluid In Rigid-Body Motion
Week 14	Continuity equation
Week 15	Fluid motion equations and applications
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Rotameter Calibration (Group A)
Week 2	Lab 2: Rotameter Calibration (Group B)
Week 3	Lab 3: Rotameter Calibration (Group C)
Week 4	Lab 4: Rotameter Calibration (Group D)
Week 5	**Midterm exam of Lab tests**
Week 6	Lab **5**: Center of Pressure (Group A)
Week 7	Lab 6: Center of Pressure (Group B)
Week 8	Lab 7: Center of Pressure (Group C)
Week 9	Lab 8: Center of Pressure (Group D)
Week 10	**Final Exam of Lab tests**

<table>
<tr><td colspan="3">Learning and Teaching Resources
مصـادر التعلم والتدريس</td></tr>
<tr><td></td><td>Text</td><td>Available in the Library?</td></tr>
<tr><td>Required Texts</td><td>Fluid Mechanics Fundamentals and Applications, Yunus A. Cengel, John M. Cimbala.</td><td>No</td></tr>
<tr><td>Recommended Texts</td><td>1-Fluid Mechanics-Victor Lyle Streeter
2-FLUID MECHANICS WITH ENGINEERING APPLICATIONS BY ROBERT L DAUGHERTY</td><td>-</td></tr>
<tr><td>Websites</td><td>1.Fundamentals of Fluid Mechanics, Munson,Young, Okiishi.
2. Introduction to Fluid Mechanics, Fox, and McDonald.
3.https://www.youtube.com/watch?v=fa0zHI6nLUo&list=PLbMVogVj5nJTZJHsH6uLCO00I-ffGyBEm</td></tr>
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APPENDIX:

Group	Grade	التقدير	Marks (%)	Definition
	GRADING SCHEME			

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

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المـادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	COMPUTER PROGRAMING	Module Delivery	
Module Type	ELECTIVE	☐ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MECH-202		
ECTS Credits	3		
SWL (hr/sem)	75		

Module Level		2	Semester (s) offered		1
Administering Department		Mechanical Engineering	College	Engineering	
Module Leader	Asst. Prof. Saif S. Irhayyim		e-mail	saiof11@tu.edu.iq	
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification		MSc.
Module Tutor	Asst. Lecturer. Noor S. Saleh		e-mail	noor.s.saleh@tu.edu.iq	
Peer Reviewer Name			e-mail		
Review Committee Approval			Version Number		

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	The MATLAB programming module aims to equip individuals with the necessary skills and knowledge to effectively utilize the MATLAB programming language and environment. Participants in this module will learn the fundamentals of MATLAB programming, including syntax, variables, data types, and control flow structures. The module aims to provide a solid foundation in writing MATLAB scripts and functions, enabling participants to solve numerical and mathematical problems efficiently. Additionally, the module aims to introduce participants to the various built-in functions and toolboxes available in MATLAB, empowering them to perform data analysis, visualization, and simulation tasks. The module also focuses on teaching participants how to develop algorithms, create models, and build user interfaces using MATLAB. By the end of the module, participants should have a comprehensive understanding of MATLAB programming and be able to apply their skills to a wide range of scientific, engineering, and data analysis applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The learning outcomes of a MATLAB programming module may include: 1. Knowledge of MATLAB Syntax: Students should acquire a solid understanding of the syntax and structure of the MATLAB programming language. They should be able to write MATLAB code using correct syntax, understand the role of various operators, and manipulate variables and data structures effectively. 2. Proficiency in MATLAB Programming: Students should gain proficiency in writing MATLAB scripts and functions to solve numerical and mathematical problems. They should be able to implement algorithms, control flow structures, and loops in MATLAB, and understand how to debug and troubleshoot their code. 3. Data Analysis and Visualization: Students should be able to perform data analysis tasks using MATLAB, including importing, cleaning, and manipulating data. They should also have the skills to create meaningful visualizations such as plots, graphs, and charts to represent and interpret data effectively. 4. Algorithm Development and Simulation: Students should be able to develop algorithms in MATLAB, including designing and implementing numerical methods for solving mathematical problems. They should also understand how to simulate real-world systems using MATLAB's simulation tools and interpret the results. 5. Application Development: Students should gain the ability to develop applications and user interfaces using MATLAB, including creating

	standalone executables and building graphical user interfaces (GUIs). They should understand how to deploy their MATLAB code for others to use and interact with.
	6. Integration with Other Tools and Languages: Students should have knowledge of integrating MATLAB with other programming languages and tools. They should understand how to interface MATLAB with external software and hardware tools commonly used in scientific and engineering domains.
	7. Problem Solving Skills: Students should develop strong problem-solving skills using MATLAB. They should be able to analyze a given problem, break it down into smaller tasks, and use MATLAB to implement effective solutions.
	8. Critical Thinking and Analysis: Students should develop critical thinking skills to evaluate and analyze the results obtained from MATLAB programs. They should be able to interpret and communicate their findings effectively.
	By achieving these learning outcomes, students will be well-equipped to utilize MATLAB for a wide range of scientific, engineering, and data analysis tasks and have a strong foundation for further exploration and application of MATLAB in their respective fields.
Indicative Contents المحتويات الإرشادية	The indicative contents of a MATLAB programming module may include: 1. Introduction to MATLAB: • Overview of MATLAB environment and features • MATLAB syntax and command window usage • Variables, data types, and basic operations 2. MATLAB Programming Basics: • Writing and executing MATLAB scripts • Control flow structures: if-else statements, loops (for and while) • User-defined functions and function files • Debugging and error handling in MATLAB 3. Numerical Computations with MATLAB: • Matrix and array operations • Vectorization and element-wise operations • Solving linear and nonlinear equations • Numerical integration and differentiation 4. Data Manipulation and Analysis • Importing and exporting data in various formats • Data cleaning and preprocessing • Statistical analysis using MATLAB functions • Data visualization techniques: plots, histograms, scatter plots, etc. 5. MATLAB Graphics and Visualization • Creating and customizing 2D and 3D plots • Plotting functions and curves • Adding labels, titles, and legends to plots • Creating interactive visualizations and animations 6. MATLAB Toolboxes and Libraries • Overview of various MATLAB toolboxes

	• Introduction to toolbox-specific functions and capabilities • Utilizing pre-built algorithms and functions for specific applications • Algorithm Development and Simulation These indicative contents provide a structured progression of topics, starting from basic MATLAB programming concepts and gradually covering more advanced topics and applications. The specific contents may vary depending on the curriculum and intended audience of the MATLAB programming module.
Course Description	The MATLAB programming course is designed to provide students with a comprehensive understanding of MATLAB, a powerful programming language and environment widely used in scientific, engineering, and data analysis domains. Through hands-on exercises and practical examples, students will learn the fundamentals of MATLAB syntax, data manipulation, and visualization. They will gain proficiency in writing MATLAB scripts and functions to solve numerical and mathematical problems, develop algorithms, and simulate real-world systems. The course will also cover topics such as application development, integration with other tools and languages, and advanced techniques like parallel computing and machine learning. By the end of the course, students will have the skills to effectively utilize MATLAB for various computational and analytical tasks, empowering them to excel in their respective fields.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The module will use a range of learning and teaching strategies, including: • Lectures: To provide students with an overview of the main concepts and principles. • Labs: To provide students with hands-on experience in programming by using MATLAB and data representation. • Assignments: To provide students with opportunities to apply their knowledge and skills to real-world problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.3
In class lectures 30 In class tests 4 Discussions 15 Laboratory hours 15	49		
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.7
Library, dorm, home memorizing 10 Preparation for tests 10 HomeWorks 6	26		
Total SWL (h/sem)	75		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	15% (15)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Lab	3	15% (15)	Continuous	
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	General Introduction to Programming in MATLAB (installation and operation of the program)
Week 2	Desktop MATLAB Program
Week 3	Symbols MATLAB Program
Week 4	Constants and Variables MATLAB Program
Week 5	Arithmetic Expression
Week 6	Arithmetic and String Statement
Week 7	Library Functions
Week 8	Midterm
Week 9	Matrixes and Operations on Matrixes (create a matrix)
Week 10	Addressing and Indexing the Matrix
Week 11	Calculations between Matrixes and between the Matrix and The Single Number
Week 12	Standard Matrixes and Searching about The Partial Matrix
Week 13	Input and Output statements
Week 14	Conditional Statements
Week 15	Partial Graphs and surface (Plotting).
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)	
المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	General Introduction to Programming in MATLAB (installation and operation of the program).
Week 2	Desktop MATLAB Program.
Week 3	Symbols MATLAB Program.
Week 4	Constants and Variables MATLAB Program.
Week 5	Arithmetic Expression.
Week 6	Arithmetic and String Statement.
Week 7	Library Functions.
Week 8	Labs. Midterm.
Week 9	Matrixes and Operations on Matrixes (create a matrix).
Week 10	Addressing and Indexing the Matrix.
Week 11	Calculations between Matrixes and between the Matrix and The Single Number.
Week 12	Standard Matrixes and Searching about The Partial Matrix.
Week 13	Input and Output statements.
Week 14	Conditional Statements.
Week 15	Partial Graphs and surface (Plotting).

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• MATLAB Reference (R2020a) by MathWorks. • Halpern, David, Howard B. Wilson, and Louis H. Turcotte. Advanced mathematics and mechanics applications using MATLAB. CRC press, 2002.	No
Recommended Texts	-	-
Websites	-	

APPENDIX:

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

Note:

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

Ministry of Higher Education and Scientific Research - Iraq University of Tikrit College of Engineering Department of Mechanical Engineering			

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	STRENGTH OF MATERIAL I	**Module Delivery**	
Module Type	CORE	Theory Lecture Tutorial Practical Seminar	
Module Code	MECH-203		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	2	**Semester (s) offered**	1
Administering Department	Mechanical Engineering	**College**	Engineeeing
Module Leader	Dr. Tahseen Taha	**e-mail**	tahseentaha@tu.edu.iq
Module Leader's Acad. Title	Ass. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr	**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

<table>
<tr><td colspan="4" align="center">**Relation With Other Modules**
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>**Prerequisite module**</td><td>ENG-102</td><td>**Semester**</td><td>1,2</td></tr>
<tr><td>**Co-requisites module**</td><td>None</td><td>**Semester**</td><td>-</td></tr>
</table>

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

<table>
<tr>
<td>**Module Aims**
أهداف المادة الدراسية</td>
<td>Enable students to develop a comprehensive understanding of the methodology of solving strength of material problems</td>
</tr>
<tr>
<td>**Module Learning Outcomes**

مخرجات التعلم للمادة الدراسية</td>
<td>1. Interpret and analyse the stress and strain in simple structures.
2. Apply the engineering Mechanics concepts for solving beams problems.</td>
</tr>
<tr>
<td>**Indicative Contents**
المحتويات الإرشادية</td>
<td>Indicative content includes the following.

• Undergraduate Review (4 hrs)
• Fundamentals of (16 hrs)
• (20 hrs)
•   (10 hrs)
• (6 hrs)</td>
</tr>
<tr>
<td>**Course Description**</td>
<td>This course aims to establish fundamental knowledge of Strength of Materials. Presentation of the course starts by introducing simple stress and simple strain utilizes it to solve problems in beams and columns and rivets.</td>
</tr>
</table>

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

<table>
<tr>
<td>**Strategies**</td>
<td>The learning and teaching **strategy** is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques, and demonstrate concepts with appropriate (and where possible practical)</td>
</tr>
</table>

		examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل In class lectures **56** In class tests **4** Seminars **4**	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل Library, dorm, home memorizing **31** Preparation for tests **20** Homeworks **10**	61	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Seminars	3	12% (12)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Simple stress- Normal stress**
Week 2	**Shearing stress- Bearing stress**
Week 3	**Simple strain –Hooks; law (Axial deformation)**
Week 4	Shearing Deformation
Week 5	Biaxial Deformation (Poisson's ratio)

Week 6	Statically indeterminate members
Week 7	Thermal stresses
Week 8	Torsion- Torsion formulas
Week 9	Torsion- Torsion formulas
Week 10	Shear and moment in beams
Week 11	Shear and bending moment diagrams
Week 12	Stresses in beams- bending stresses
Week 13	Stresses in beams- bending stresses
Week 14	Unsymmetric beams
Week 15	Shearing stresses in beams
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Tensile Test
Week 2	Lab 2: Torsion Test
Week 3	Lab 3: Flexural of Beams

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Strength of Materials by Ferdinand L. Singer, Andrew Pytet	Yes
Recommended Texts	Mechanics of Materials by E.J. Hearn	No
Websites	http://	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		
Module Title	ENGINEERING MECHANICS- PARTICLES DYNAMICS	**Module Delivery**
Module Type	BASIC	Theory Lecture Tutorial Practical Seminar
Module Code	MECH-205	
ECTS Credits	5	
SWL (hr/sem)	125	

Module Level	2	**Semester (s) offered**	1
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	20/05/2023	**Version Number**	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	(ENG-102) Engineering Mechanics-Static	**Semester**	1
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	1. Introducing the basic principles of engineering mechanics- dynamics. 2. Introducing the basic analysis methods of the particle dynamics. 3. Analyzing the patterns and relationships of the given problems with practical examples. 4. Strengthen the basic mechanical sense of the student. 5. Strengthen the utilization of the mathematical tools in the study subjects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: 1. Prepare and understand engineering mechanics – particle dynamics. 2. Identify various problems and classify them in order to project the correct solution method. 3. Use the principles of differential equations. 4. Use of the correct tools for solving different examples. 5. Prepare the students for the next subject of rigid body dynamics.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Kinematics of particle • Rectilinear motion • Curvilinear motion • Normal-tangential coordinates • Polar coordinates • Relative motion • Kinetics of particles • Work and energy methods
Course Description	In this course, the students will be introduced to the fundamentals of Dynamics of Engineering Mechanics. The topics will cover a wide range of applications that, collectively, form building blocks of the dynamics world for an everyday mechanical engineer. Typically, the course starts with the behavior and properties of particles and the fundamental relationships of distance, velocity, and acceleration. There is a broad spectrum to cover to accommodate most of the applications in more than one coordinate system. The analysis of particle dynamics forms the basis for the rigid body mechanics.

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **60** **In class tests** 3	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 22 **Preparation for tests** **20** **HomeWorks** **20**	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	All	LO #1, 2, 3, and 4
	Assignments	6	30% (30)	All	LO # 1, 2, 3, 4, 5 and 6
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to dynamics
Week 2	Absolute motion – Rectilinear motion
Week 3	Absolute motion – Rectilinear motion
Week 4	Absolute motion – Curvilinear motion
Week 5	Absolute motion – Curvilinear motion

Week 6	Absolute motion – Normal and tangential coordinate system
Week 7	Midterm
Week 8	Absolute motion – Polar coordinate system
Week 9	Absolute motion – Polar coordinate system
Week 10	Relative Motion – Velocity and acceleration
Week 11	Relative Motion – Velocity and acceleration
Week 12	Kinetics of particles – Newton's second law
Week 13	Kinetics of particles – Rectilinear and curvilinear motion
Week 14	Kinetics of particles – Work and Energy
Week 15	Kinetics of particles – Work and Energy
Week 16	**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 Mechanics: Dynamics 6th edition, by Meriam, J. L., Kraige, L. G. (2006)	Yes
Recommended Texts	Engineering Mechanics: Dynamics, by R. C. Hibbeler 2004.	No
Websites	https://www.engineer4free.com/dynamics.html	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

<table>
<tr><td colspan="4" align="center">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td>جرائم نظام البعث في العراق</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td>غير أساسية(داعمة)</td><td colspan="2" rowspan="4" align="center">محاضرات نظرية</td></tr>
<tr><td>Module Code</td><td>ENG-114</td></tr>
<tr><td>ECTS Credits</td><td>2</td></tr>
<tr><td>SWL (hr/sem)</td><td>50</td></tr>
<tr><td>Module Level</td><td>1</td><td>Semester (s) offered</td><td>1</td></tr>
<tr><td>Min number of students</td><td>15</td><td>Max number of students</td><td>100</td></tr>
<tr><td>Administering Department</td><td>Mechanical Engineering</td><td>College</td><td>Engineering</td></tr>
<tr><td>Module Leader</td><td>Sabah Mahdi Salih</td><td>e-mail</td><td>sabahmahdi@tu.edu.iq</td></tr>
<tr><td>Module Leader's Acad. Title</td><td>Assistant Professor</td><td>Module Leader's Qualification</td><td>MSc</td></tr>
<tr><td>Module Tutor</td><td>None</td><td>e-mail</td><td>None</td></tr>
<tr><td>Peer Reviewer Name</td><td></td><td>e-mail</td><td></td></tr>
<tr><td>Review Committee Approval</td><td>01/06/2023</td><td>Version Number</td><td>1.0</td></tr>
</table>

<table>
<tr><td colspan="4" align="center">**Relation With Other Modules**
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>**Prerequisite module**</td><td>لايوجد</td><td>**Semester**</td><td>1</td></tr>
<tr><td>**Co-requisites module**</td><td>لايوجد</td><td>**Semester**</td><td>-</td></tr>
</table>

<table>
<tr><td colspan="2" align="center">**Module Aims, Learning Outcomes, Indicative Contents and Brief Description**
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr><td>**Module Aims**
أهداف المادة الدراسية</td><td dir="rtl">١ـ التعرف على جرائم الحزب والانتهاكات التي قام بها خلال فترة الحكم.
٢ـ القدرة على فهم الاثار السلبية لهذا الحزب على الجانب النفسي والاجتماعي والثقافي لأفراد الشعب العراقي.
٣ـ التعرف على التأثير السلبي على واقع البيئة العراقية.</td></tr>
<tr><td>**Module Learning Outcomes**

مخرجات التعلم للمادة الدراسية</td><td dir="rtl">١ـ التعرف على المصطلحات ذات الصلة بجرائم الجزب.
٢ـ التعرف على اهم الاثار السلبية الذي تركها الحزب على واقع المجتمع العراقي في جميع مجالات الحياة.</td></tr>
<tr><td>**Indicative Contents**
المحتويات الإرشادية</td><td dir="rtl">يتضمن المحتوى الارشادي ماياتي:
١ـ انتهاكات الحقوق والحريات (٨ ساعات).
٢ـ التأثير على الميدان النفسي والاجتماعي (٢ساعة).
٣ـ التأثير على الميدان الثقافي والدين والدولة وعسكرة المجتمع (٢ساعة).
٤ـ اثر القمع على البيئة والسكان (٣) ساعات</td></tr>
<tr><td>**Course Description**</td><td dir="rtl">**جرائم حزب البعث: هي الجرائم التي ارتكبها الحزب بأبناء الشعب العراقي والتي ادت الى اثار سلبية على المستوى النفسي والاجتماعي والثقافي والاقتصادي والبيئي وعسكرة المجتمع.**</td></tr>
</table>

<table>
<tr><td colspan="2" align="center">**Learning and Teaching Strategies**
استراتيجيات التعلم والتعليم</td></tr>
<tr><td>**Strategies**</td><td dir="rtl">تم وضع استراتيجية التعلم والتعليم من اجل ان يحصل الطالب على معلومات كاملة تغطي المنهج الدراسي المعد للمادة ولكي تتحقق الغاية الاساسية للمنهج الذي ينصب نحو الام وادراك الطالب بالجرائم والاثار السلبية التي قام بها الحزب على نسيج المجتمع العراقي ، والاطلاع على الانتهاكات والتجاوزات التي حصلت اثناء فترة الحكم من اجل منع تكرار تلك التجربة مستقبلا.</td></tr>
</table>

<table>
<tr><td colspan="4" align="center">**Student Workload (SWL)**
الحمل الدراسي للطالب</td></tr>
<tr><td>**Structured SWL (h/sem)**
الحمل الدراسي المنتظم للطالب خلال الفصل</td><td>33</td><td>**Structured SWL (h/w)**
الحمل الدراسي المنتظم للطالب أسبوعيا</td><td>2.1</td></tr>
</table>

In class lectures	30		
In class tests	3		

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 (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3, 5, ,7, 9,11,13,	LO #1, 2,3,4,........ ,11
	Assignments (Homeworks)	6	15% (15)	2, 4, 6, 10,12,14	LO # 1, 2, 3, 4 ,.......,11
	Discussions	7	5% (5)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	8	LO # 1-7
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	نبذة وصفية عن الانظمة السياسية في العراق من عام ١٩٢١-٢٠٠٣
Week 2	انتهاكات النظام البعثي للحقوق والحريات العامة
Week 3	اثر سلوكيات النظام البعثي في المجتمع
Week 4	اثر المرحلة الانتقالية في محاربة السياسة الاستبدادية
Week 5	الميدان النفسي
Week 6	الميدان الاجتماعي
Week 7	الدين والدولة
Week 8	امتحان نصف الفصل
Week 9	الثقافة والاعلام وعسكرة المجتمع

Week 10	استعمال الاسلحة المحرمة دوليا والتلوث البيئي
Week 11	سياسة الارض المحروقة
Week 12	تجفيف الاهوار
Week 13	المقابر الجماعية وتدمير دور العبادة
Week 14	امثلة واقعية عن جرائم الحزب من واقع المجتمع العراقي
Week 15	مراجعة لمحتويات المادة
Week 16	امتحان نهاية الفصل

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	منهاج معتمد من الوزارة	Yes
Recommended Texts		No
Websites	N/A	

APPENDIX:

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

Note:

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MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		
Module Title	ENGINEERING METALLURGY	**Module Delivery**
Module Type	CORE	Theory
Module Code	MECH-204	Lecture
ECTS Credits	5	Laboratory
SWL (hr/sem)	125	Practical Seminar

Module Level	2	**Semester (s) offered**	1
Min number of students	15	**Max number of students**	100
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader	Saad Ramadhan Ahmed	**e-mail**	Saadramadhan82@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	PhD
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Farouk M. Mahdi	**e-mail**	Farouk_1959_1996@tu.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	1,2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	To impart knowledge on the structure, properties, treatment, testing and applications of metals and non-metallic materials so as to identify and select suitable materials for various engineering applications
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification. 2. Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes. 3. Clarify the effect of alloying elements on ferrous and non-ferrous metals 4. Summarize the properties and applications of nonmetallic materials. 5. Explain the testing of mechanical properties.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • ALLOYS AND PHASE DIAGRAMS (4 hrs) • HEAT TREATMENT (4 hrs) • FERROUS AND NON-FERROUS METALS (4 hrs) • NON-METALLIC MATERIALS (4 hrs) • MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS (4 hrs)
Course Description	The central point of this course is to provide a physical basis that links the structure of materials with their properties, focusing primarily on metals. With this understanding in hand, the concepts of alloy design and microstructural engineering are also discussed, linking processing and thermodynamics to the structure and properties of metals.

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 and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems. In addition, a set of experiments were delivered to consolidate the theoretical concepts.

Student Workload (SWL)					
الحمل الدراسي للطالب					
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا		4.3
In class lectures	30				
In class tests	4				
Discussions	15				
Laboratory hours	15				
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا		4.1
Library, dorm, home memorizing	25				
Preparation for tests	25				
HomeWorks	11				
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		125			

Module Evaluation					
تقييم المادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments (Homeworks)	5	10% (10)	2, 4, 6, 8, 10	LO # 1, 2, 3, 4, 5 and 6
	Seminars	4	8% (8)	Continuous	
	Discussions	6	12% (12)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري
	Material Covered
Week 1	Constitution of alloys – Solid solutions, substitutional a n d interstitial – phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron – carbon equilibrium diagram. Classification of steel and cast-Iron microstructure, properties and application.
Week 2	Constitution of alloys – Solid solutions, substitutional a n d interstitial – phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron – carbon equilibrium diagram. Classification of steel and cast-Iron microstructure, properties and application. Cont'd
Week 3	Definition – Full annealing, stress relief, recrystallisation and spheroidising – normalizing, hardening, and tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram CCR – Hardenability, Jominy end quench test - Austempering, martempering – case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening – Vacuum and Plasma hardening.
Week 4	Definition – Full annealing, stress relief, recrystallisation and spheroidising – normalizing, hardening, and tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram CCR – Hardenability, Jominy end quench test - Austempering, martempering – case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening – Vacuum and Plasma hardening. Cont'd
Week 5	Effect of alloying additions on steel- α and β stabilisers– stainless and tool steels – HSLA, Maraging steels – Cast Iron - G r e y, white, malleable, spheroidal – alloy cast irons, Copper and copper alloys – Brass, Bronze and Cupronickel – Aluminum and Al-Cu – precipitation strengthening treatment Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys.
Week 6	Effect of alloying additions on steel- α and β stabilisers– stainless and tool steels – HSLA, Maraging steels – Cast Iron - G r e y, white, malleable, spheroidal – alloy cast irons, Copper and copper alloys – Brass, Bronze and Cupronickel – Aluminum and Al-Cu – precipitation strengthening treatment Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys. Cont'd
Week 7	Midterm exam
Week 8	Effect of alloying additions on steel- α and β stabilisers– stainless and tool steels – HSLA, Maraging steels – Cast Iron - G r e y, white, malleable, spheroidal – alloy cast irons, Copper and copper alloys – Brass, Bronze and Cupronickel – Aluminum and Al-Cu – precipitation strengthening treatment Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys. Cont'd
Week 9	Effect of alloying additions on steel- α and β stabilisers– stainless and tool steels – HSLA, Maraging steels – Cast Iron - G r e y, white, malleable, spheroidal – alloy cast irons, Copper and copper alloys – Brass, Bronze and Cupronickel – Aluminum and Al-Cu – precipitation strengthening treatment Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys. Cont'd
Week 10	Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers – Urea and Phenol formaldehydes)- Engineering Ceramics – Properties and applications of Al_2O_3, SiC, Si_3N_4, PSZ and SIALON –Composites-Classifications- Metal Matrix and FRP - Applications of Composites.
Week 11	Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers – Urea and Phenol formaldehydes)- Engineering Ceramics – Properties and applications of Al_2O_3, SiC, Si_3N_4, PSZ and SIALON –Composites-Classifications- Metal Matrix and FRP - Applications of Composites. Cont'd
Week 12	Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers – Urea and Phenol formaldehydes)- Engineering

	Ceramics – Properties and applications of Al_2O_3, SiC, Si_3N_4, PSZ and SIALON –Composites-Classifications- Metal Matrix and FRP - Applications of Composites. Cont'd
Week 13	Mechanisms of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test lzod and charpy, fatigue and creep failure mechanisms.
Week 14	Mechanisms of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test lzod and charpy, fatigue and creep failure mechanisms. Cont'd
Week 15	Mechanisms of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test lzod and charpy, fatigue and creep failure mechanisms. Cont'd
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, Revised Indian, Edition 2014	Yes
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.	No
Websites	N/A	

APPENDIX:

	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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	ENGINEERING ANALYSIS	**Module Delivery**	
Module Type	SUPLEMENT	Theory Lecture Tutorial Practical Seminar	
Module Code	MATH-201		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	2	**Semester (s) offered**	1
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader	Dr. Ibrahim Thamer Nazzal	**e-mail**	dribrahimthamer@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Ibrahim Thamer Nazzal	**e-mail**	dribrahimthamer@tu.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

<table>
<tr><td colspan="4">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td>-</td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td>-</td></tr>
</table>

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	The aim of this module is to develop students' mathematical knowledge with a comprehensive understanding of the mathematics used in mechanical engineering and develop the necessary skills for its use. This module also aims to equip students with the knowledge and skill to be able to analyze a variety of engineering systems. Through a combination of practical mechanical engineering applications and theoretical knowledge, this module equips students with the necessary foundation to pursue further studies in mechanical engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the module, the students will be able to: • Explain basic concepts of mathematical modeling and engineering analysis. • Identify the type of analysis suitable for the solution of an engineering problem with their respective advantages and limitations. • Recognize and explain equations governing typical engineering problems. • A greater understanding of various mathematical modeling techniques and mathematical theory with their respective advantages and limitations and begin to analyze how they relate to the solution of unfamiliar engineering problems. • Demonstrate knowledge and understanding of mathematical principles necessary to underpin their education across mechanical engineering. • Enable students to apply mathematical methods, tools, and notations proficiently in the analysis and solution of mechanical engineering problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • First Order Ordinary Differential Equation • Second Ordinary Differential Equations • Simultaneous Linear Differential Equations • Special Functions. • Laplace Transform • Fourier Series • Fourier Transform • Orthogonality Properties of Sine and Cosine • Partial Differential Equations

Course Description	This course will cover a range of engineering analysis techniques related to the first and second differential and then utilizes it to solve problems in mechanical engineering applications, methods for solving differential equations are discussed. the course also includes power series solutions, special functions, and Laplace transforms and utilizes it to solve the differential equation. Fourier series and separation of variables are also introduced.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The learning and teaching strategy is designed to introduce engineering analysis and machine learning through theory with work examples carried out by the students. This is carefully delivered through lectures including question and answer sessions, demonstrating captured content, problem-solving, tutorial classes, and project methods with the students conducting a coursework assignment.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 75 **In class tests** 3	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 20 **Prepartion for tests** 20 **Homeworks** 7	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Seminars	3	12% (12)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

<table>
<tr><td colspan="2">Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري</td></tr>
<tr><td></td><td>Material Covered</td></tr>
<tr><td>Week 1</td><td>First Order Ordinary Differential Equations
 -Separable Equations
- Linear Equations
- Exact Equations</td></tr>
<tr><td>Week 2</td><td>Second Ordinary Differential Equations
Homogeneous
Non- Homogeneous (un-determent Coefficient, Variation of Parameter</td></tr>
<tr><td>Week 3</td><td>Homogeneous Equations Higher Order, The Euler Cauchy Differential Equations,</td></tr>
<tr><td>Week 4</td><td>Power Series Solutions</td></tr>
<tr><td>Week 5</td><td>Simultaneous Linear Differential Equations</td></tr>
<tr><td>Week 6</td><td>Special Functions.
-Gamma Function
 -Euler Beta Function</td></tr>
<tr><td>Week 7</td><td>Midterm exam</td></tr>
<tr><td>Week 8</td><td>Laplace Transform
The General Method
The Transform of Special Functions</td></tr>
<tr><td>Week 9</td><td>The Shifting Theorems
The Differentiation and Integration of Transforms</td></tr>
<tr><td>Week 10</td><td>Solving Differential Equations by Laplace Transform</td></tr>
<tr><td>Week 11</td><td>Fourier Series
The Euler Formulas
Half Range Expansion</td></tr>
<tr><td>Week 12</td><td>Fourier Transform
Properties of Fourier Transform
Solving Differential Equations by Fourier Transform</td></tr>
<tr><td>Week 13</td><td>Orthogonality Properties of Sine and Cosine</td></tr>
<tr><td>Week 14</td><td>Partial Differential Equations
Separation of Variables (Heat Equations)</td></tr>
<tr><td>Week 15</td><td>Partial Differential Equations
Separation of Variables (Wave Equations)</td></tr>
<tr><td>Week 16</td><td>Final Exam</td></tr>
</table>

<table>
<tr><td>Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر</td></tr>
</table>

	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	Advanced Engineering Analysis C. Ray Wylie	Yes
Recommended Texts	Advanced Engineering Mathematics, Kreyszig Kreyszig, 10th Edition, John Wiley & Sons, Inc	No
Websites	https://www.thriftbooks.com/w/advanced-engineering-mathematics_clarence-raymond-wylie/327947/#edition=3546946&idiq=4215961	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Departments of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	Electrical Engineering	**Module Delivery**	
Module Type		Theory Lecture Tutorial Practical	
Module Code	MECH-104		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	1	**Semester (s) offered**	2
Administering Department	Mechanical	**College** Engineering	
Module Leader	Ahmed Hefdhi Mohsin	**e-mail**	Ahmed.h.mohsin@tu.edu.iq
Module Leader's Acad. Title	Asst. Lecturer	**Module Leader's Qualification**	MSC.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval	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, Indicative Contents and Brief Description	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	1. Theoretical and practical to develop problem solving skills and understanding of circuit theory through the application of techniques. 2.To understand voltage, current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems for DC and AC circuits. 6. To perform Mesh, Nodal analysis, and superposition , Thevenin, Norton and maximum power transfer theorems for DC and AC circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: 1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Identify the basic circuit elements and their applications. 5. Describe electrical power, charge, and current. 6. Define Ohm's law and Explain the two Kirchoff's laws used in circuit analysis for DC and AC circuits and bridge networks for DC and AC circuits. 7. Discuss the various properties of resistors, capacitors, and inductors. 9. Solve basic electrical problems using Mesh, Nodal analysis, and superposition , Thevenin, Norton and maximum power transfer theorems for DC and AC circuits.

Indicative Contents
المحتويات الإرشادية
	Indicative content includes the following.
	    DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law.
	    , Introduction to Mesh, Nodal analysis, and superposition , Thevenin, Norton and maximum power transfer theorems for DC circuits.
	    AC circuits – Time dependent signals, average and RMS values. Capacitance and inductance.
	    Bridge networks for DC and AC circuits.
	    Elements in series and parallel. Kirchhoff's laws and Ohm's law.
	    , Introduction to Mesh, Nodal analysis, and superposition , Thevenin, Norton and maximum power transfer theorems for AC circuits.

Course Description	The electrical engineering course focus on basic electrical elements

	and fundamentals of electrical quantities such as voltage , current, resistor and electrical power then to series, parallel and how to analyze the electrical circuits in Mesh, Nodal for DC and AC circuits as well as bridge circuits then move to Alternating current AC circuits and students will able to get knowledge to Time dependent signals, average and RMS values. Capacitance and inductance. Elements in series and parallel. Kirchhoff's laws and Ohm's law. , Introduction to Mesh, Nodal analysis, and superposition , Thevenin, Norton and maximum power transfer theorems for AC circuits.
Learning and Teaching Strategies	
استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students..

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 60** **In class tests 4**	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 35** **Prepartion for tests 30** **Homeworks 21**	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	9	5% (5)	All	LO #1, 2, 3, and 9
	Assignments	9	15% (15)	All	LO # 1, 2, 3, 4, 5 and 9
Summative assessment	**Midterm Exam**	2	30% (30)	7	LO # 1-5
	Final Exam	2	50% (50)	16	All
Total assessment			100% (100		

	Marks)		

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<tr><td colspan="2">Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري</td></tr>
<tr><td></td><td>Material Covered</td></tr>
<tr><td>Week 1</td><td>Current, Voltage , Ohm's Law , Power and Energy Concepts</td></tr>
<tr><td>Week 2</td><td>DC Series, Parallel Circuits and DC Series – Parallel networks</td></tr>
<tr><td>Week 3</td><td>DC Bridge networks , Star –Delta conversions</td></tr>
<tr><td>Week 4</td><td>Methods of DC Analysis – Mesh</td></tr>
<tr><td>Week 5</td><td>Methods of DC Analysis – Nodal</td></tr>
<tr><td>Week 6</td><td>DC Network Theorem - Superposition</td></tr>
<tr><td>Week 7</td><td>DC Thevenin Theorem</td></tr>
<tr><td>Week 8</td><td>Midterm exam , DC Norton Theorem and Maximum Power Transfer Theorem</td></tr>
<tr><td>Week 9</td><td>The Basic Elements of AC Circuits and Sinusoidal Alternating Waveforms</td></tr>
<tr><td>Week 10</td><td>AC Series, Parallel Circuits and AC Series – Parallel networks</td></tr>
<tr><td>Week 11</td><td>AC Bridge networks , Star –Delta conversions</td></tr>
<tr><td>Week 12</td><td>Methods of AC Analysis – Mesh</td></tr>
<tr><td>Week 13</td><td>Methods of AC Analysis – Nodal</td></tr>
<tr><td>Week 14</td><td>AC Network Theorem - Superposition</td></tr>
<tr><td>Week 15</td><td>AC Thevenin Theorem, Norton Theorem and Maximum Power Transfer Theorem</td></tr>
<tr><td>Week 16</td><td>Final Exam</td></tr>
</table>

<table>
<tr><td colspan="2">Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر</td></tr>
<tr><td></td><td>Material Covered</td></tr>
<tr><td>Week 1</td><td>Resistor Color Band and Ohm's Law Experiment</td></tr>
<tr><td>Week 2</td><td>DC Series, Parallel Circuits and DC Series – Parallel networks Experiment</td></tr>
<tr><td>Week 3</td><td>DC Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL)</td></tr>
<tr><td>Week 4</td><td>DC Mesh and Nodal Experiment</td></tr>
<tr><td>Week 5</td><td>DC Superposition Theorem Experiment</td></tr>
<tr><td>Week 6</td><td>DC Thevenin Theorem Experiment</td></tr>
<tr><td>Week 7</td><td>DC Norton Theorem Experiment</td></tr>
<tr><td>Week 8</td><td>Maximum Power Transfer Theorem Experiment</td></tr>
</table>

Week 9	The Basic Elements of AC Circuits and Sinusoidal Alternating Waveforms Experiment
Week 10	AC Series, Parallel Circuits and DC Series – Parallel networks Experiment
Week 11	AC Mesh Experiment
Week 12	AC Superposition Theorem Experiment
Week 13	AC Thevenin Theorem Experiment
Week 14	Maximum Power Transfer Theorem Experiment
Week 15	
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introductory circuit analysis , Robert L. Boylestad ,Pearson Publishing Company , 12nd Edition , 2022	Yes
Recommended Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
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Fail Group (0 – 49)	**FX –** Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB 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 DESCRIPTOR
وصف المـادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	THERMODYNAMICS	**Module Delivery**	
Module Type	CORE	Theory Lecture Tutorial Practical Seminar	
Module Code	MECH-101		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	1	**Semester (s) offered**	2
Administering Department	mechanical Engineering	**College**	Engineering
Module Leader	Dr. Hameed Jassim Khalaf	**e-mail**	hameed.j.khalaf@tu.edu.iq
Module Leader's Acad. Title	Lecture	**Module Leader's Qualification**	Ph.D
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

<table>
<tr><td colspan="4" align="center">**Relation With Other Modules**
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>**Prerequisite module**</td><td>MECH-304, MECH-308, MECH-406</td><td>**Semester**</td><td>- 1,2</td></tr>
<tr><td>**Co-requisites module**</td><td></td><td>**Semester**</td><td>-</td></tr>
<tr><td colspan="4" align="center">**Module Aims, Learning Outcomes, Indicative Contents and Brief Description**
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr><td>**Module Aims**
أهداف المادة الدراسية</td><td colspan="3">-To cover the *basic principles* of thermodynamics
-To present a wealth of real-world engineering examples to give students a feel for how thermodynamics is applied in engineering practice.
-To develop an intuitive understanding of thermodynamics by emphasizing the physics and physical arguments</td></tr>
<tr><td>**Module Learning Outcomes**

مخرجات التعلم للمادة الدراسية</td><td colspan="3">On completion of this course students will be able to:
1. Understand the principles of thermodynamics, develop the schematic diagram for the system, and apply energy balance models to develop governing equations.
2. Set up and solve for engineering thermal systems according to first and second law of thermodynamics
3. Understand the energy conversion and where it is used.
4. Understand the approach for open and closed systems and its practical applications.</td></tr>
<tr><td>**Indicative Contents**
المحتويات الإرشادية</td><td colspan="3">Indicative content includes the following.
• Introduction to thermodynamics (6hrs)
• The first law of thermodynamics is introduced, energy, energy transfer and general energy analysis (6hrs)
• A general understanding of various forms of energy, mechanical of energy transfer, the concepts of energy balance, thermo-economics, energy conversion, and conversion efficiency using familiar setting that involve mostly electrical and mechanical forms of energy. (6hrs)
• Exposes students to some exciting real-world applications of thermodynamics early in this course, and helps them establish a sense of the monetary value of energy(9hrs)
• Steam formations and steam tables (6hrs)
• Enthalpies, internal energies in thermodynamics open and closed systems (9hrs)</td></tr>
<tr><td>**Course Description**</td><td colspan="3">Thermodynamics is an exciting and fascinating subject that deals with energy, which is essential for sustenance of life, and thermodynamics has long been an essential part of engineering curricula all of the world. It has a broad application area ranging from microscopic organisms to common household appliances, transportation vehicles, power generation systems, this course contains sufficient material for fundamental and principles of thermodynamics.</td></tr>
</table>

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 60** **In class tests 4**	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 30** **Prepartion for tests 16** **Homeworks 15**	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	All	All
	Assignments	5	30% (30)	All	All
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Basic concepts related to thermodynamics, introduction, definition of engineering thermodynamics, definition of thermodynamics
Week 2	Definition of thermodynamic laws, thermodynamic systems
Week 3	Thermodynamic systems, system, boundary and surroundings, closed system, open system. control volume and control surface, isolated system, adiabatic system, macroscopic and microscopic approach, thermodynamic equilibrium, properties of systems, state, process, non-flow process and flow processes, cycle.
Week 4	Point functions, path functions, temperature, Zeroth-law of thermodynamics, pressure, definition of pressure, gauge pressure, vacuum pressure and absolute of pressure, units of pressure, manometer, barometer, U-Tube manometer, reversible and irreversible processes, energy, work and heat, reversible work
Week 5	Tutorial sheets
Week 6	The first-law of thermodynamic and its applications, corollaries of first-law of thermodynamics, perpetual motion machine of first kind(PMM1), the perfect gas, Boyle's law, Charle's law, the characteristic equation of gas, Avogadro's hypothesis.
Week 7	Midterm exam
Week 8	Specific heats, Joule's law, internal energy, enthalpy, forms of energies.
Week 9	Applications of first-law of thermodynamics to non-flow processes, steady non-flow energy equation, reversible constant-volume process(Isochoric process), reversible constant- pressure process(Isobaric process), constant temperature process(or Isothermal process), adiabatic process, polytropic process, relationship between T-V-P.
Week 10	Applications of first-law to steady-flow processes, steady-flow energy equation, engineering applications of steady flow-energy equation, water turbine, steam or gas turbine, centrifugal water pump, centrifugal compressor, reciprocating compressor.
Week 11	Steam and two-phase systems, the formation of steam, saturation of temperature and pressure, the triple point
Week 12	Enthalpy and the formation of steam at constant pressure, steam tables, reference state of tables, liquid enthalpy, enthalpy of evaporation, enthalpy of dry saturated vapor, enthalpy of superheated vapor
Week 13	Temperature-enthalpy diagram, volume of steam, volume of water, volume of dry saturated steam, volume of wet steam, volume of superheated steam, the internal energy of steam
Week 14	Dryness fraction of wet steam, Examples
Week 15	Summary of subject course
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered

Week 1	Bolye's Law
Week 2	Measuring the ratio between the two specific heats(γ)
Week 3	The relationship between saturation pressure and temperature of water vapor
Week 4	Discussions
Week 5	Specific heats of solids
Week 6	Heat pump
Week 7	Discussions

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Cengel, Y., & Thermodynamics: An engineering Approach, *Seven edi*.	Yes
Recommended Texts	Applied thermodynamics for engineering technologists, third edi, by T.D.EASTOP	Yes
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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 DESCRIPTOR
وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	MANUFACTURING PROCESSES 1		**Module Delivery**	
Module Type	CORE		Theory Lecture Laboratory Practical Seminar	
Module Code	MECH-103			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	1	**Semester (s) offered**		2
Min number of students	25	**Max number of students**		130
Administering Department	Mechanical Engineering	**College**	Engineering	
Module Leader	Mohammed Salih Ahmed	**e-mail**	Mohammed.Ahmed72@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**		PhD
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name	Dr. Farouk M. Mahdi	**e-mail**	Farouk_1959_1996@tu.edu.iq	
Review Committee Approval	01/06/2023	**Version Number**	1.0	

<table>
<tr>
<td colspan="4" align="center">**Relation with Other Modules**
العلاقة مع المواد الدراسية الأخرى</td>
</tr>
<tr>
<td>**Prerequisite module**</td>
<td>None</td>
<td>**Semester**</td>
<td>2</td>
</tr>
<tr>
<td>**Co-requisites module**</td>
<td>None</td>
<td>**Semester**</td>
<td>-</td>
</tr>
<tr>
<td colspan="4" align="center">**Module Aims, Learning Outcomes, Indicative Contents and Brief Description**
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td>
</tr>
<tr>
<td>**Module Aims**
أهداف المادة الدراسية</td>
<td colspan="3">The main goal of this course is to develop the student's knowledge and introduce him to the importance of engineering materials in industry. The physical and mechanical properties of some important tests that are carried out on engineering materials such as the tensile test, Shock resistance test and hardness test, in addition to methods of nailing and identifying metals for forming or forming operations.</td>
</tr>
<tr>
<td>**Module Learning Outcomes**

مخرجات التعلم للمادة الدراسية</td>
<td colspan="3">1- Explain manufacturing materials which contains, manufacturing materials definition, manufacturing materials classification, Manufacturing materials selection and Production of metallic materials

2- Study the properties of Engineering Materials which include importance of metals in industry, physical properties of metals ,mechanical properties of metals so as to Engineering materials testing and Metal preparation methods.</td>
</tr>
<tr>
<td>**Indicative Contents**
المحتويات الإرشادية</td>
<td colspan="3">Indicative content includes the following.

● Production of Metallic Material   (4hours)
● Physical &Mechanical Properties of Metallic Material   (4hours)
● Machining of Metals   (4hours)
● Casting   (4hours)
● Metal Forming   (4hours)
● Plastics   (2hours)
● Metal Connection   (4hours)
● Engineering Tolerances   (2hours)</td>
</tr>
<tr>
<td>**Course Description**</td>
<td colspan="3">The essential point in this coarse is to give the basics of manufacturing processes, starting with the definition and classification of materials, in addition to methods of selection. And then focus on studying the physical and mechanical properties and methods of preparing minerals. Non-traditional operations with their details were also discussed</td>
</tr>
<tr>
<td colspan="4" align="center">**Learning and Teaching Strategies**
استراتيجيات التعلم والتعليم</td>
</tr>
<tr>
<td>**Strategies**</td>
<td colspan="3">The learning and teaching **strategy** is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a</td>
</tr>
</table>

		large number of carefully selected tutorial problems. In addition, a set of experiments were delivered to consolidate the theoretical concepts.			

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		49	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.3
In class lectures	27			
In class tests	7			
Practical	15			
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		76	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.0
Library, dorm, home memorizing	40			
Preparation for tests	30			
Homework's	6			
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		125		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments (Homeworks)	5	10% (10)	2, 4, 6, 8, 10	LO # 1, 2, 3, 4, 5 and 6
	Seminars	4	8% (8)	Continuous	
	Discussions	6	12% (12)	Continuous	
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered	
Week 1	Production of Metallic Material	
Week 2	Production of Metallic Material	
Week 3	Physical &Mechanical Properties of Metallic Material	
Week 4	Physical &Mechanical Properties of Metallic Material	
Week 5	Machining of Metals	
Week 6	Machining of Metals	
Week 7	**Midterm exam**	
Week 8	Casting	
Week 9	Casting	
Week 10	Metal Forming	
Week 11	Metal Forming	
Week 12	Plastics	
Week 13	Metal Connection	
Week 14	Metal Connection	
Week 15	Engineering Tolerances	
Week 16	**Final Exam**	

	Learning and Teaching Resources مصادر التعلم والتدريس	
	Text	**Available in the Library?**
Required Texts	Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, Revised Indian, Edition 2014	Yes
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",	No

	Prentice Hall of India Pvt. Ltd., 2015.	
Websites	N/A	

APPENDIX:

<table>
<tr><td colspan="5">GRADING SCHEME
مخطط الدرجات</td></tr>
<tr><td>Group</td><td>Grade</td><td>التقدير</td><td>Marks (%)</td><td>Definition</td></tr>
<tr><td rowspan="5">Success Group
(50 - 100)</td><td>A - Excellent</td><td>امتياز</td><td>90 - 100</td><td>Outstanding Performance</td></tr>
<tr><td>B - Very Good</td><td>جيد جدا</td><td>80 - 89</td><td>Above average with some errors</td></tr>
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<tr><td>E - Sufficient</td><td>مقبول</td><td>50 - 59</td><td>Work meets minimum criteria</td></tr>
<tr><td rowspan="2">Fail Group
(0 – 49)</td><td>FX – Fail</td><td>مقبول بقرار</td><td>(45-49)</td><td>More work required but credit awarded</td></tr>
<tr><td>F – Fail</td><td>راسب</td><td>(0-44)</td><td>Considerable amount of work required</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Note:</td><td colspan="3"></td></tr>
<tr><td colspan="5">NB 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.</td></tr>
</table>

MODULE DESCRIPTOR

وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		
Module Title	DEMOCRACY AND HUMAN RIGHT (الديمقراطية وحقوق الانسان)	**Module Delivery**
Module Type	SUPLEMENT	محاضرات نظرية
Module Code	ENG-108	
ECTS Credits	3	
SWL (hr/sem)	75	

Module Level	2	**Semester (s) offered**	1
Min number of students	15	**Max number of students**	100
Administering Department		**College**	Engineeeing
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	MSc
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Ahmed Hussein khunfas	**e-mail**	ahmed.husain@tu.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

<table>
<tr><td colspan="4" align="center">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>لايوجد</td><td>Semester</td><td>1</td></tr>
<tr><td>Co-requisites module</td><td>لايوجد</td><td>Semester</td><td>-</td></tr>
<tr><td colspan="4" align="center">Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td></tr>
<tr><td colspan="2">Module Aims
أهداف المادة الدراسية</td><td colspan="2">١-القدرة على ادراك المفهوم الاساسي لحقوق الانسان والطفل والديمقراطية.
٢- القدرة على فهم الاصول التاريخية للمفهومين. ومعرفة ايجابيات وسلبيات حقوق الانسان والديمقراطية.
٣- الاطلاع على حقوق الانسان والطفل والديمقراطية في الاسلام.
٤- التعرف على مصادر حقوق الانسان والطفل وخصائص وسمات الديمقراطية.
٥—معرفة اثر التطور التكنولوجي على حقوق الانسان والطفل والديمقراطية.
٦-التطرق لمفاهيم ذات صلة بالمصطلحين مثل (العولمة، مؤسسات المجتمع المدني ، الانتخابات والاستفتاء ، الحكم الرشيد ، الجرائم الانسانية، الدستور).
٧-الاطلاع على الضمانات التي تكفل حقوق الانسان والطفل وتكفل النظام الديمقراطي والحقوق والحريات العامة.</td></tr>
<tr><td colspan="2">Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td><td colspan="2">١- التعرف على المصطلحات ذات الصلة بمفهوم حقوق الانسان والطفل والديمقراطية.
٢- التعرف على اهم الحقوق التي كفلها الإسلام للإنسان والطفل واستثمارها في معالجة الآفات والحالات السلبية التي تغزو المجتمعات في العصر الحالي .
الاستفادة من مزايا الديمقراطية ومكوناتها في معالجة التذبذب وعدم الاستقرار في المجتمع والحفاظ على الاستقرار والسلم المجتمعي.
٣- الاطلاع على المواثيق الدولية المختصة بمجالات حقوق الانسان والطفل الصادرة عن المنظمات الدولية وجمعية الأمم المتحدة.
٤- الاستفادة من تجارب الاخرين (الدول المتقدمة في مجالات حقوق الانسان والطفل والديمقراطية).
٥- اللمام بالقوانين والدساتير الدولية والإقليمية والمحلية المختصة بقضايا حقوق الانسان والحريات العامة والديمقراطية.
٧- التعرف على جرائم الإبادة الجماعية والجرائم الإنسانية ومدى تأثيرها على مفهوم حقوق الانسان والطفل والديمقراطية.</td></tr>
<tr><td colspan="2">Indicative Contents
المحتويات الإرشادية</td><td colspan="2">يتضمن المحتوى الارشادي ماياتي:
١- حقوق الانسان والطفل والديمقراطية في الحضارات القديمة والإسلام (٨ ساعات).
٢- مصادر حقوق الانسان العالمية والمحلية، خصائص وسمات الديمقراطية (٤ ساعات).
٣- ضمانات حقوق الانسان العالمية والمحلية وضمانات النظام الديمقراطي (٤ ساعات).
٤- حقوق الانسان والطفل والديمقراطية واثر التقدم التكنولوجي عليهما (٤ ساعات).
٥- العولمة ، مؤسسات المجتمع المدني ، الانتخابات والاستفتاء، الدستور(٤ ساعات)
٦- الجرائم الإنسانية وانواعها ، الحكم الرشيد ، (٢ ساعة).
٧- الوثائق الدولية الخاصة بحقوق الطفل والديمقراطية المعاصرة (٤ ساعات).</td></tr>
<tr><td colspan="2">Course Description</td><td colspan="2">حقوق الانسان: هي حقوق يتمتع بها جميع مكونات البشر لمجرد اننا من ابناء البشر, وهذه الحقوق متأصلة في جميع البشر مهما كان عرقهم او جنسهم او قوميتهم او مذهبهم ولاتمنح من أي دولة، وتتضمن حقوق الانسان والطفل في الحضارات القديمة والاسلام، المواثيق الدولية ، مصادر وضمانات حقوق الانسان ، القوانين والدساتير، مجلس حقوق الانسان، العولمة، التقدم التكنولوجي واثره على حقوق الانسان.</td></tr>
</table>

	الديمقراطية: يرجع مصطلح الديمقراطية الى الحضارة اليونانية القديمة وهي عبارة عن مصطلح مكون من مقطعين هما: (Cratia) التي تعني حكم و (Demo) التي تعني الشعب ليصبح المفهوم حكم الشعب ، وتتضمن الديمقراطية التطرق الى مفهومها ومعرفة الجذور التاريخية لها ، المكونات ، الخصائص ، المميزات ، الضمانات ، علاقة الديمقراطية ب (الدستور ، مؤسسات المجتمع المدني ، حقوق الانسان ، الحكم الرشيد، الانتخابات) ، الديمقراطية المعاصرة

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	تم وضع استراتيجية التعلم والتعليم من اجل ان يحصل الطالب على معلومات كاملة تغطي المنهج الدراسي المعد للمادة ولكي تتحقق الغاية الاساسية للمنهج الذي ينصب نحو المام وادراك الطالب بالمفاهيم الاساسية لحقوق الانسان والديمقراطية ، والاطلاع على المصادر والضمانات والمواثيق الدولية للمصطلحين من اجل استثمارها في معالجة الظواهر السلبية في المجتمع والحفاظ على الاستقراروالسلم المجتمعي .

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
In class lectures	45			
In class tests	3			
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		27	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
Memorizing: 17 Preparion for test : 10 Project:				
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		75		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3, 5, ,7, 9,11,13,	LO #1, 2,3,........., 11
	Assignments (Homeworks)	6	15% (15)	2, 4, 6, 10,12,14	LO # 1, 2, 3, ...,11
	Discussions	7	5% (5)	Continuous	
Summative	Midterm Exam	2	10% (10)	8	LO # 1-7

assessment	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	الجذور التاريخية لحقوق الانسان والديمقراطية في الحضارات القديمة
Week 2	حقوق الانسان والطفل والديمقراطية في الاسلام
Week 3	مصادر حقوق الانسان على المستوى الخارجي الدولي، سمات وخصائص الديمقراطية
Week 4	مصادر حقوق الانسان على المستوى الداخلي المحلي، مزايا الديمقراطية
Week 5	ضمانات حقوق الانسان على المستوى المحلي، مكونات الديمقراطية
Week 6	ضمانات حقوق الانسان على المستوى الدولي، الضمانات التي تكفل النظام الديمقراطي
Week 7	مجلس حقوق الانسان، الانتخابات واهميتها
Week 8	امتحان نصف الفصل
Week 9	التطور التكنولوجي واثره على حقوق الانسان والطفل والديمقراطية
Week 10	مفهوم العولمة، مؤسسات المجتمع المدني
Week 11	الحكم الرشيد (المبادئ، المعايير) ، الاستفتاء
Week 12	الدستور وانواعه
Week 13	حقوق الطفل في المواثيق والعهود الدولية
Week 14	الجرائم الانسانية (جرائم الابادة الجماعية) وتأثيرها على حقوق الانسان والطفل والانظمة الديمقراطية
Week 15	الديمقراطية المعاصرة وحقوق الانسان والطفل ودراسة حالات لأمثلة واقعية حدثت في المجتمعات الدولية والعربية وفي العراق.
Week 16	امتحان نهاية الفصل

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	كتاب حقوق الانسان والديمقراطية. من تأليف :١-ا.د. ماهر صالح علاوي الجبوري، ا.د رياض عزيز هادي ، ا.د. رعد ناجي الجدة، ا.م.د كامل عبد العنكود ، ا.م.د علي عبد الرزاق محمد، ا.د. حسان محمد شفيق، (٢٠٠٩)	Yes
Recommended Texts	١- ـالديمقراطية ،من تأليف : تشارلز تيللي ، ترجمة محمد فاضل طباخ ، الهيئة المصرية العامة للكتاب،(٢٠١٠).	No

	٢ـ كتاب حقوق الانسان الاساسية والدور الامني لحمايتها، المؤلف: الدكتور مبارك علوي محمد،(٢٠١٩).	
Websites	N/A	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المـادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	اللغة العربية	Module Delivery	
Module Type	غير أساسية(داعمة)	محاضرات نظرية	
Module Code	ENG-113		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	1	Semester (s) offered	1
Min number of students	15	Max number of students	100
Administering Department	Chemical Engineering	College	Engineering
Module Leader	Wasna younis Abdullah	e-mail	Wasna.y.abdullah@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	Module Leader's Qualification	MSc
Module Tutor	None	e-mail	
Peer Reviewer Name	Ahmed Hussein khunfas	e-mail	Ahmed.husain@tu.edu.iq
Review Committee Approval	01/06/2023	Version Number	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	لايوجد	**Semester**	1
Co-requisites module	لايوجد	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	١ـتطوير المهارات اللغوية وحفظ بعض السور القرآنية وتعزيز حب اللغة لدى الطلبة. ٢ـفهم كيفية تطبيق القواعد اللغوية في الحياة اليومية، ومعرفة المصطلحات اللغوية في مجالات الهندسة والعلوم. ٣ـأهمية اللغة العربية في مجالات الحياة اليومية ٤ـاستخدام القواعد اللغوية في كتابة التقارير والأبحاث العلمية بشكل صحيح. ٥ـــتعزيز التعلم الذاتي والاستقلالية في التعلم وتشجيع الطلاب على أخذ مبادرة في تعلم اللغة العربية.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	١ـ فهم القواعد اللغوية وعلامات الترقيم وحفظ السور القرآنية. ٢ـتطوير المحصلة اللغوية لدى الطلبة من خلال تعلم الشعر والقواعد اللغوية بشكل صحيح. ٣ـتغطية معظم المواضيع اللغوية التي يحتاجها المهندس في مسيرته العملية ٤ـالتدرب على الحفظ والنطق الصحيح لبعض السور القرآنية بالإضافة إلى التدرب على قراءة الشعر العربي وتعلم واستخدام قواعد اللغة العربية ٥ـ الممارسات المتكررة لشرح المادة النظرية واستخدام الآلات والوسائل الحديثة بشرح المادة مع ضمان ملائمة المادة النظرية للاحتياجات الواقعية
Indicative Contents المحتويات الإرشادية	يتضمن المحتوى الارشادي ماياتي: ١ـسورة الضحى (٣ ساعة). ٢ـقصة ذي القرنين (٣ ساعات). ٣ـقصة النبي موسى عليه الصلاة والسلام مع سيدنا الخضر (٤ ساعات). ٤ـمعلقة عمرو بن كلثوم (٤ ساعات). ٥ـقصيدة المتنبي شعب بوان(٤ ساعات). ٥ـقصيدة محمد مهدي الجواهري يا دجلة الخير) (٤ساعات). ٦ـأنواع الهمزات (٤ ساعات). ٧ـعلامات الترقيم (٤ ساعات).
Course Description	اللغة العربية: هي ما نطق به العرب، أو هي لغتهم، وهي اللغة السامية التي حفظت وجودها، وهي لغة عالمية وإنسانية حية تتميز بنظام صوتي وصرفي ونحوي وتركيبي، ولألفاظها مدلولات مختلفة، فهي اللسان الذي تكلمه العرب، ونزل به القرآن الكريم الذي لا يمكن فهمه إلا من خلال فهم اللغة العربية.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	ان استراتيجية التعلم هي أسلوب تعليمي يعتد على إعادة تنظيم المعلومات وتكييفها بطريقة تمكن من الوصول إلى معلومات جديدة، وتتميز هذه الاستراتيجية بأنها تجعل الطالب نشطاً وايجابياً ودورنا يتمثل في دور الموجه والمرشد والمخطط وهذا يُمكّن من اكتشاف المعرفة بسلاسة من قبل الطلاب.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 30 **In class tests** 3	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 (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3, 5, ,7, 9,11,13,	LO #1, 2,3,4,....... ,11
	Assignments (Homeworks)	6	15% (15)	2, 4, 6, 10,12,14	LO # 1, 2, 3, 4 ,.......,11
	Discussions	7	5% (5)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	8	LO # 1-7
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	سورة الضحى

Week 2	قصة ذي القرنين
Week 3	قصة النبي موسى عليه الصلاة والسلام مع سيدنا الخضر عليه السلام
Week 4	معلقة عمرو بن كلثوم
Week 5	قصيدة المتنبي شعب بوان
Week 6	قصيدة محمد مهدي الجواهري يا دجلة الخير
Week 7	همزة القطع وهمزة الوصل
Week 8	امتحان نصف الفصل
Week 9	الهمزة المتوسطة والهمزة المتطرفة
Week 10	علامات الترقيم
Week 11	كتابة الضاد والظاء
Week 12	الفعل الصحيح
Week 13	الفعل المعتل
Week 14	اسم الفاعل
Week 15	اسم المفعول
Week 16	امتحان نهاية الفصل

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**اللغة العربية لأقسام غير الاختصاص**	Yes
Recommended Texts	**التفسير الوسيط أ.د. وهبة الزحيلي** **المنهاج في القواعد والإعراب: محمد الأنطاكي**	No
Websites	N/A	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	Calculus II		Module Delivery	
Module Type	Core		Theory Lecture Tutorial Practical Seminar	
Module Code	MATH-102			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level		1	Semester (s) offered	2
Administering Department	mechanical Engineering	College	Engineering	
Module Leader	Dr. Ataalah H. Jassim	e-mail	ataalahhussain@tu.edu.iq	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	Ph.D.	
Module Tutor	None	e-mail	None	
Peer Reviewer Name		e-mail		
Review Committee Approval	01/06/2023	Version Number	1.0	

<table>
<tr><td colspan="4" align="center">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td>-</td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td>-</td></tr>
</table>

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	Developing of student ability in the general mathematics principle and applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: General concepts, Vectors (Cross ,Dot Product), Multiple Integral (Double, Triple in Rectangular, Cylindrical and Spherical) and Applications, Complex Number and its Polar representation, Roots.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Vectors (30hrs) • Applications of Partial of Derivative (5hrs) • Multiple Integral (20hrs) • Complex Number (20hrs)
Course Description	This course is based on the principles of Euclidean, plane, and solid geometries. Students will be introduced to the basic postulates and theorems of geometry and encouraged to extend these ideas to the topics of similarity, circles, area, volume, and proof. In addition, students are involved in a more technological, theoretical, and algebraic approach to geometry.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The learning and teaching **strategy** is designed to: We designed teaching strategies to support students' development of mathematical knowledge and problem solving as well as communication and team working skills. We used an action research perspective as various methods within this stance can ensure flexibility in responding to the dynamics of interaction between the teachers and the students.

Student Workload (SWL)
الحمل الدراسي للطالب

<table>
<tr><td>Structured SWL (h/sem)
الحمل الدراسي المنتظم للطالب خلال الفصل
In class lectures   75
In class tests   3</td><td>78</td><td>Structured SWL (h/w)
الحمل الدراسي المنتظم للطالب أسبوعيا</td><td>5.3</td></tr>
<tr><td>Unstructured SWL (h/sem)</td><td>72</td><td>Unstructured SWL (h/w)</td><td>4.8</td></tr>
</table>

الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 32** **Prepartion for tests 20** **Homeworks 20**		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	30% (30)	All	LO #1, 2, 3, and 4
	Assignments	6	10% (10)	All	LO # 1, 2, 3, 4, 5 and 6
Summative assessment	**Midterm Exam**	2	30% (30)	7	LO # 1-3
	Final Exam	3	30% (30)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Vectors: Vector in Space, Dot and Cross Products
Week 2	Equations for Lines and Planes in Space
Week 3	Function of Two and more Variables and Their Derivatives: Partial Derivatives, Chain Rules
Week 4	Partial Derivatives with Constants Variables
Week 5	Gradient and Directional Derivatives
Week 6	Tangent Plane and normal lines
Week 7	Applications of Partial of Derivative (maximum, minimum and saddle point)
Week 8	Multiple Integral: Double integral
Week 9	Double integral in polar coordinates
Week 10	Changing Cartesian integrals into Polar integrals
Week 11	Triple integral (Rectangular, Cylindrical and Spherical)
Week 12	Complex Number: Addition, Subtraction
Week 13	Multiplication and Division
Week 14	Polar representation of Complex Number
Week 15	Roots

Week 16	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 George B. Thomas, Jr. publishing company, 2010	Yes
Recommended Texts	"Engineering Mathematics" by K. A. Stroud, Dexter J. Booth, 5th edition, Industrial press Inc., New York, 2001. Advanced_Engineering_Mathematics_By_Erwin_Kreyszig_tenth_Edition, 2011 Higher Engineering Mathematics by JOHN, 2010	No
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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 DESCRIPTOR

وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	ENGLISH I	Module Delivery	
Module Type	SUPLEMENT	Theory Lecture Tutorial Project Seminar	
Module Code	HUMN-102		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	1	Semester (s) offered	2
Min number of students	15	Max number of students	100
Module Leader	Thamir Kh. Ibrahim	e-mail	
Module Leader's Acad. Title	Professor	Module Leader's Qualification	PhD
Module Tutor	Asst. Prof. Ahmed S. Abdullah	e-mail	Ahmedsubhi1981@tu.edu.iq
Module Tutor	None	e-mail	None
Peer Reviewer Name		e-mail	

Review Committee Approval	01/06/2023	Version Number	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	1,2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify various reading skills and apply them in reading, referencing and summarizing literature on engineering 2. Identify various skills of technical presentation and apply them in conducting short technical presentations based on information extracted from readings 3. Identify technical discussion skills and apply these in planning and conducting simulated technical discussions characteristic of those that go on in engineering contexts. 4. Identify and compare the structures and language characte-ristics of various types of written study and workplace reports characteristic of those produced by engineering students and practicing engineers (e.g., incident reports and progress reports) mainly, and applying this knowledge in writing one of the latter 5. Develop communication skills through active participation in class and group activities.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Technical presentations (5 hrs) • Conducting technical discussions about engineering projects (5 hrs) • Writing technical documents (5 hrs) • Writing business correspondence (5 hrs)

	This course is designed to provide engineering students with the necessary oral and written skills required for effective communication in academic and workplace contexts, both with experts in their field and lay persons. It begins by introducing them to the principles of good academic practice, which are also presented as a model for ethical workplace practice, and thus help them to avoid issues such as plagiarism. The main part then leads on to developing research and summarizing skills that form the basis for the later activities. Students next learn to apply these skills to conducting technical presentations, as well as in group discussions that culminate in project planning activities.
Course Description	

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل In class lectures 2 In class tests 3 Seminars	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل Library, dorm, home memorizing 7 Preparation for tests 7 HomeWorks 3	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 (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	6	18% (18)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Seminars	3	12% (12)	Continuous	

Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	A technical presentation Students will perform various secondary research skills acquired to extract information of an engineering topic from different sources. They will then conduct a short technical presentation based on this information, using the presentation skills learnt
Week 2	
Week 3	
Week 4	Technical discussions and proposal writing Incorporating research results from the previous activities, students will develop a customised solution to address a context-specific problem facing a client's organization. The solution will need to be written in a recognized proposal format (e.g., a blueprint). Each student will craft one section of the document according to her/his role on the project team. Students will also plan and conduct a simulated technical team meeting with the client team to explain and discuss the solution by applying various planning and discussion skills learnt
Week 5	
Week 6	
Week 7	Midterm exam
Week 8	Conducting technical discussions about engineering projects Students will be guided to identify technical discussion skills through various types of exploratory and/or consciousness-raising activities, such as watching sample discussions and evaluating their effectiveness. They learn how to discuss with a client the customised technical design of a solution that can address a context-specific problem facing the client. They then apply these skills in conducting simulated technical team discussions, according to the roles assigned to them.
Week 9	
Week 10	
Week 11	A technical report Each student produces a technical report by applying the knowledge gained in the related TLAs
Week 12	
Week 13	
Week 14	Writing business correspondence Students will produce a business email, based on the results of the previous activities, and by applying the textual features learnt.
Week 15	
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Beer, D. & McMurrey, D. 2004, A Guide to Writing as an Engineer (2nd ed), New York: Wiley	No
Recommended Texts	Borowick, Jerome N., 2002, Technical Communication and its Applications (2nd ed), New Jersey: Prentice-Hall, Inc.	No
Websites	http://umich.edu/~elements/5e/lectures/index.html	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			

Module Title	MECHANICAL DRAWING	**Module Delivery**	
Module Type	CORE	Theory Lecture Practical Seminar	
Module Code	MECH_102		
ECTS Credits	6		
SWL (hr/sem)	150		

Module Level	1	**Semester (s) offered**	2
Min number of students	15	**Max number of students**	100
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader	Saad Ramadhan Ahmed	**e-mail**	Saadramadhan82@tu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	PhD
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr. Farouk M. Mahdi	**e-mail**	Farouk_1959_1996@tu.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	1,2
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	• Develop skills in the reading, interpretation and production of Mechanical Engineering drawings and diagrammatic illustrations conforming to ASTM and ISO Standards. • To make the students to understand the concepts of I.S. conventions, methods of dimensioning, the title boxes, to draw the machine elements and simple parts. • To make the students to understand and draw assemblies of machine parts and to draw their sectional views
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing the Mechanical Engineering Drawing course, the student will be able to: • Apply the engineering standards and best practices in engineering drawing. • Assign tolerances, surface finish, limits and fits for mechanical components. • Recognize the different elements used for making non-permanent joints. • Recognize the different permanent joining methods and standard welding symbols. • - Recognize the function, terminology, and common standards associated with the different types of mechanical elements.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Mechanical draughting (6 hrs) • Screw threads, square threads and helical springs (12 hrs) • Orthographic projection (6 hrs) • Gears and Keys (6 hrs) • Limits and Fits (12 hrs) • Cams (6 hrs) • Sectioning (12 hrs) • Detail drawing (12 hrs) • Assembly drawings (6 hrs)
Course Description	This course will introduce students to the concepts and techniques of mechanical drawing. It will cover basic line drawings, use of mechanical drawing equipment, isometric and orthographic projections, and geometric drawings. Students will prepare geometrical drawings and draw layouts. This course will also enable students to perform layout of structural steel using fabricating practices. Students will be able to determine elevations of

	structures and how to construct using calculating equipment including transits, scientific calculators, and various squaring and leveling tools. The student will also be able to calculate the layout of pipe including figuring offsets, runs, and travel distances.

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 and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems. In addition, a set of experiments were delivered to consolidate the theoretical concepts.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 30 **Practical** 45 **In class tests** 3	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5.20
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 30 **Preparation for tests** 12 **HomeWorks** 30	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.80
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments (Homeworks)	5	10% (10)	2, 4, 6, 8, 10	LO # 1, 2, 3, 4, 5 and 6
	Seminars	4	8% (8)	Continuous	
	Discussions	6	12% (12)	Continuous	
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

<table>
<tr><td colspan="2" align="center">**Delivery Plan (Weekly Syllabus)**
المنهاج الاسبوعي النظري</td></tr>
<tr><td></td><td>**Material Covered**</td></tr>
<tr><td>**Week 1**</td><td>Engineering working drawings basics</td></tr>
<tr><td>**Week 2**</td><td>Sections, Assemblies, Exploded views</td></tr>
<tr><td>**Week 3**</td><td>Preferred numbers, Tolerances</td></tr>
<tr><td>**Week 4**</td><td>Limits and fits</td></tr>
<tr><td>**Week 5**</td><td>Surface finish</td></tr>
<tr><td>**Week 6**</td><td>Mechanical fasteners, Power screws</td></tr>
<tr><td>**Week 7**</td><td>Midterm exam</td></tr>
<tr><td>**Week 8**</td><td>Shafts and associated components</td></tr>
<tr><td>**Week 9**</td><td>Bearings, Seals</td></tr>
<tr><td>**Week 10**</td><td>Gears</td></tr>
<tr><td>**Week 11**</td><td>Flexible mechanical elements (Belts, Roller chains, Wire robes)</td></tr>
<tr><td>**Week 12**</td><td>Mechanical springs</td></tr>
<tr><td>**Week 13**</td><td>Steel Structural sections</td></tr>
<tr><td>**Week 14**</td><td>Steel Structural sections</td></tr>
<tr><td>**Week 15**</td><td>Welding</td></tr>
<tr><td>**Week 16**</td><td>**Final Exam**</td></tr>
</table>

<table>
<tr><td colspan="3" align="center">**Learning and Teaching Resources**
مصادر التعلم والتدريس</td></tr>
<tr><td></td><td align="center">**Text**</td><td align="center">**Available in the Library?**</td></tr>
<tr><td>**Required Texts**</td><td>higly's Mechanical Engineering Design; Budynas & Nisbett; 9 th Edition; McGraw Hill; 2011.</td><td align="center">Yes</td></tr>
<tr><td>**Recommended Texts**</td><td>Machine Drawings; K.L. Narayana, 3rd Edition; New Age International Publishers; New Delhi; 2006</td><td align="center">No</td></tr>
<tr><td>**Websites**</td><td>N/A</td><td></td></tr>
</table>

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	**FX –** Fail	مقبول بقرار	(45-49)	More work required but credit awarded
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Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**ENGINEERING MECHANICS**		Module Delivery	
Module Type	**BASIC**		Theory	
Module Code	**ENG- 102**		Lecture	
ECTS Credits	**5**		Tutorial	
SWL (hr/sem)	125		Practical	
			Seminar	
Module Level	1	**Semester (s) offered**	1	
Min number of students	15	**Max number of students**	100	
Administering Department	Mechanical Engineering	**College**	Engineering	
Module Leader	Raaid Rashad Jassem	**e-mail**	raaidaldoury@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	PhD	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name		**e-mail**		
Review Committee Approval	01/06/2023	**Version Number**	1.0	

<table>
<tr>
<td colspan="4" align="center">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</td>
</tr>
<tr>
<td>Prerequisite module</td>
<td>None</td>
<td>Semester</td>
<td>1,2</td>
</tr>
<tr>
<td>Co-requisites module</td>
<td>None</td>
<td>Semester</td>
<td>-</td>
</tr>
<tr>
<td colspan="4" align="center">Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر</td>
</tr>
<tr>
<td>Module Aims
أهداف المادة الدراسية</td>
<td colspan="3">1) To provide definition of force and moment vectors and give necessary vector algebra
2) To explain the concept of equilibrium of particles and rigid bodies in plane and 3D space
3) To give information about support types and to give ability to calculate support reactions
4) To explain the equilibrium of structures and internal forces in trusses, and frames
5) To give information about distributed loads
6) To explain centroid of bodies and Figures.
7)To provide information on moment of inertia</td>
</tr>
<tr>
<td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td>
<td colspan="3">1) Use both conceptual and numerical techniques to solve engineering problems.
2) Analyze and develop free-body diagrams for any system of forces in two and three dimensions.
3) Understand and use the general idea of equilibrium of a particle.
4) Understand and use the general ideas of force system resultants.
5) Determine the moment of a force about an arbitrary point and/or axes
6) Analyze the equilibrium of rigid bodies under any system of forces.
7) Analyze trusses, beams, frames, and machines.
8) Calculate center of gravity, centroids, and moments of inertia.
9) Apply friction forces and analyze their different applications.</td>
</tr>
<tr>
<td>Indicative Contents
المحتويات الإرشادية</td>
<td colspan="3">Indicative content includes the following.

• Force Vectors   (8 hrs.)
• Force System Resultants (8 hrs.)
• Equilibrium of a Rigid Body (8 hrs.)
• Friction   (8 hrs.)
• Center of Gravity and Centroid (6 hrs.)
• Moments of Inertia and virtual work (8 hrs.)
• Structure (trusses and Frames)   (10 hrs.)</td>
</tr>
<tr>
<td>Course Description</td>
<td colspan="3">The course covers the following topics; statics of particles: forces in plane, forces in space, equilibrium, moment of a force, moment of a couple, equivalent systems of forces on rigid bodies, equilibrium in two dimensions,</td>
</tr>
</table>

	equilibrium in three dimensions, distributed forces: centroids and center of gravity, analysis of structures: trusses, frames and machines, internal forces in beams and cables, friction, moments of inertia of areas, moments of inertia of masses.

<table>
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استراتيجيات التعلم والتعليم</td></tr>
<tr><td>Strategies</td><td>The learning and teaching strategy is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.</td></tr>
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<table>
<tr><td colspan="4">Student Workload (SWL)
الحمل الدراسي للطالب</td></tr>
<tr>
<td>Structured SWL (h/sem)
الحمل الدراسي المنتظم للطالب خلال الفصل

In class lectures   45
In class tests   5
Seminars   4
Discussions   10</td>
<td>64</td>
<td>Structured SWL (h/w)
الحمل الدراسي المنتظم للطالب أسبوعيا</td>
<td>4.3</td>
</tr>
<tr>
<td>Unstructured SWL (h/sem)
الحمل الدراسي غير المنتظم للطالب خلال الفصل

Library, dorm, home memorizing 30
Prepartion for tests   20
Homeworks   11</td>
<td>61</td>
<td>Unstructured SWL (h/w)
الحمل الدراسي غير المنتظم للطالب أسبوعيا</td>
<td>4.1</td>
</tr>
<tr>
<td>Total SWL (h/sem)
الحمل الدراسي الكلي للطالب خلال الفصل</td>
<td colspan="3">125</td>
</tr>
</table>

<table>
<tr><td>Module Evaluation
تقييم المادة الدراسية</td></tr>
</table>

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments (Homeworks)	5	10% (10)	2, 4, 6, 8, 10	(LO # 1, 2, 3, 4, 5 and 6)
	Seminars	4	8% (8)	Continuous	SOL3,5
	Discussions	6	12% (12)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

	Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري
	Material Covered
week1	General principles, Principles of statics, vectors
Week 2	Planar forces, resultant of a force system
Week 3	Planar forces, resultant of a force system
Week 4	The free body diagram, definition of moment, moment of a couple
Week 5	The free body diagram, definition of moment, moment of a couple
Week 6	Equilibrium in 2-D, free body diagrams, equations of equilibrium
Week 7	Midterm exam
Week 8	(Equilibrium in 3-D, free body diagrams, equations of equilibrium)[SOL1]
Week 9	(STRUCTURES Trusses and frames)
Week 10	(STRUCTURES Trusses and frames) [SOL6]
Week 11	Center of mass, Gravity and centroid
Week 12	Centroids of Lines, Areas, and Volumes
Week 13	Moments of inertia
Week 14	Moments of inertia
Week 15	Friction (dry friction)
Week 16	**Final Exam**

	Learning and Teaching Resources مصادر التعلم والتدريس	
	Text	**Available in the Library?**
Required Texts	**Engineering Mechanics-Statics, J.L.Meriam, L.G.Kraige, Wiley, 5th Edition, 2003, ISBN: 0-471-26607-8**	Yes
Recommended Texts	**Engineering Mechanics-Statics, Hibbeler, R.C.13th Edition, Pearson Prentice Hall, 2016, ISBN 978-0-13-31892-2."**	yes
Websites	N/A	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX – Fail**	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB 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 DESCRIPTOR

وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		
Module Title	ENGINEERING DRAWING	**Module Delivery**
Module Type	CORE	
Module Code	ENG-101	Theory Lecture Tutorial Practical Seminar
ECTS Credits	6	
SWL (hr/sem)	150	

Module Level	1	Semester (s) offered	1
Administering Department	mechanical Engineering	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

<table>
<tr><td colspan="4">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td>-</td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td>-</td></tr>
</table>

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	1. Define and explain the uses of different drawing equipment. 2. Identify the different drawing equipment. 3. Layout drawing papers and prepare a title block. 4. Practically distinguish the types of dimensioning. 5. Carry out geometrical construction of different shapes. 6. Carry out isometric and orthographic drawing of objects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: 1. Prepare and understand drawings. 2. Identify various curves used in Engineering Drawing and their applications. 3. Use the principles of orthographic projections. 4. By studying about isometric projections students will be able to visualize three-dimensional objects and that will enable them to design new products. 5. Design and fabricate surfaces of different shapes. 6. Represent the objects in three dimensional appearances
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction to Drawing Equipment (12hrs) • Geometrical Construction (24hrs) • Orthographic Projection (18hrs) • Sectional views(12hrs) • Isometric Projections(18hrs) • Dimensioning(6hrs)
Course Description	An engineering drawing course focuses on usage of drawing instruments, lettering, construction of geometric shapes, etc. Students study use of dimensioning, shapes and angles or views of such drawings. Dimensions feature prominently, with focus on interpretation, importance and accurate reflection of dimensions in engineering drawing. Other areas of study in this course may include projected views and development of surfaces.

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, and demonstrate concepts with appropriate (and where possible practical)

	examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل In class lectures 90 In class tests 3	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل Library, dorm, home memorizing 22 Preparation for tests 15 Homeworks 20	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 (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	all	LO #1, 2, 3, and 4
	Assignments	6	30% (30)	All	LO # 1, 2, 3, 4, 5 and 6
Summative assessment	Midterm Exam	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to engineering drawing
Week 2	Primary elements of drawings
Week 3	Geometrical Construction
Week 4	Tangency
Week 5	Loci applications
Week 6	Tangency and loci applications

Week 7	Dimensioning
Week 8	Theory of Projection
Week 9	Orthographic Projections
Week 10	Orthographic Projections
Week 11	Sections and Sectional views
Week 12	Sections and Sectional views
Week 13	Isometric Projections
Week 14	Isometric Projections
Week 15	Isometric Projections
Week 16	**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 Drawing, Abdul-Rassul Abdul-Hussain, University of Technology, 1986.	Yes
Recommended Texts	SIMMONS, C., MAGUIRE, D., PHELPS, N., 2021. Manual of engineering Drawing Technical product specification and Documentation to British and International Standards, **4** ed, Elsevier Ltd:Oxford REDDY, K. , 2008. Textbook of Engineering Drawing. 2ed, Adithya Art Printers:Hyderabad	No

	SHAH, M. B. , RANA, B. C. , 2007. Engineering Drawing. 2ed, Dorling Kindersley(India) Pvt. Ltd :India	
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
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Ministry of Higher Education and
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University of Tikrit
College of Engineering
Department of Mechanical Engineering

MODULE DESCRIPTOR
وصف المـادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	COMPUTER SCIENCE	**Module Delivery**	
Module Type	SUPLEMENT	⬛ Theory ⬛ Lecture ⬛ Lab ⬛ Tutorial ⬛ Practical ⬛ Seminar	
Module Code	ENG-104		
ECTS Credits	3		
SWL (hr/sem)	75		
Module Level	1	**Semester (s) offered**	1
Administering Department	Mechanical Engineering	**College**	Engineering
Module Leader	Dr. Fayadh M Abid	**e-mail**	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval	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, Indicative Contents and Brief Description			
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	The aim of this module is to provide students with a comprehensive understanding of the key concepts and principles of computer science. Through the study of topics such as history, data representation, computer components, algorithms, programming languages, operating systems, applications, internet and networking, and cybersecurity, students will gain a broad understanding of the field of computer science and how it has evolved over time.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the historical development of computer science and its impact on society. 2. Understand the various methods of data representation and manipulation. 3. Identify the components of a computer and their functions. 4. Design and implement algorithms for a range of problems. 5. Understand the principles of programming languages and apply them to develop software. 6. Understand the structure and functions of operating systems. 7. Identify and analyze a range of applications of computer science. 8. Understand the principles of internet and networking technologies. 9. Identify and analyze various cybersecurity threats and methods of prevention.		
Indicative Contents المحتويات الإرشادية	- History introduction: Evolution of computer science, pioneers and important milestones - Data representation: Binary numbers, hexadecimal, character sets, ASCII and Unicode - Computer components: CPU, memory, input/output devices, storage devices - Algorithms: Definition, representation, complexity, searching, sorting, optimization - Programming languages: Syntax, semantics, variables, functions, control structures, abstraction - Operating systems: Structure, file systems, process management, memory management - Applications: Databases, artificial intelligence, computer graphics, human-computer interaction - Internet and networking: Protocols, network architectures, security, privacy - Cybersecurity: Threats, attacks, prevention, detection, mitigation		

Course Description	This course offers students a comprehensive exploration of the fundamental concepts and principles that underpin the field of computer science. By delving into various subjects including the historical development of computing, data representation, computer components, algorithms, programming languages, operating systems, applications, internet and networking, and cyber-security, students will develop a well-rounded understanding of the discipline. By examining the evolution of computer science over time, students will acquire a broad perspective on the field and its significance in contemporary society. Through a combination of theoretical knowledge and practical applications, this module equips students with the necessary foundation to pursue further studies or careers in computer science.
Learning and Teaching Strategies	
استراتيجيات التعلم والتعليم	
Strategies	The module will use a range of learning and teaching strategies, including: - **Lectures**: To provide students with an overview of the main concepts and principles. - **Labs**: To provide students with hands-on experience of programming, algorithms, and data representation. - **Assignments and Quizzes**: To provide students with opportunities to apply their knowledge and skills to real-world problems and check their understanding.

Student Workload (SWL)			
الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	49	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** 12 **Preparation for tests** 10 **home works** 4	26	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	2, 4, 6, 10	LO #1, 3, 5 and 6
	Assignments	2	15% (15)	3, 5, 13, 14	LO # 2, 4, 7 and 8
	Lab	14	15% (15)	Continuous	
Summative assessment	**Midterm Exam**	1.5	10% (10)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	History introduction: Evolution of computer science, pioneers and important milestones
Week 2	Data representation: Binary numbers, hexadecimal, character sets, ASCII and Unicode
Week 3	Computer components: CPU, memory, input/output devices, storage devices
Week 4	Algorithms: Definition, representation, complexity, searching, sorting, optimization
Week 5	Programming languages I
Week 6	Programming languages II
Week 7	Midterm
Week 8	Operating systems I
Week 9	Operating systems II
Week 10	Applications I: Information Systems
Week 11	Applications II: artificial intelligence
Week 12	Applications III: computer graphics, human-computer interaction
Week 13	Networking
Week 14	Internet
Week 15	Cybersecurity: Threats, attacks, prevention, detection, mitigation
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Computer Operating System (e.g. Microsoft Windows)
Week 2	Lab 2: Document Processing I (e.g. Microsoft Word)
Week 3	Lab 3: Document Processing II (e.g. Microsoft Word)
Week 4	Lab 4: Data Processing I (e.g. Microsoft Excel)
Week 5	Lab 5: Data Processing II (e.g. Microsoft Excel)
Week 6	Lab 6: Presentation Slides I (e.g. Microsoft PowerPoint)
Week 7	Lab 7: Presentation Slides II (e.g. Microsoft PowerPoint)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Computer Science Illuminated, by Dale, N and Lewis, J, 7th Ed, Jones & Bartlett Learning, 2020**	No
Recommended Texts	-	-
Websites	-	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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 DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	ENGINEERING WORKSHOPS		Module Delivery	
Module Type	CORE		**Theory** **Lecture** **Tutorial** **Practical** **Seminar**	
Module Code	ENG-106			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level		1	Semester (s) offered	1
Administering Department		All Departments	College	Engineering
Module Leader	Abd fares Ali		e-mail	abdfaris@tu.edu.iq
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification	MSC.
Module Tutor	Mahmoud Shukri Dirar		e-mail	mahmoed_alosi@yahoo.com
Peer Reviewer Name		Abbas Ali & Qais k. Shaakir	e-mail	Kanoosh.abbasali@tu.edu.iq / qshaakir@tu.edu.iq
Review Committee Approval		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, Indicative Contents and Brief Description	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	Theoretical and practical training in which the student is scientifically and technically established with the most necessary skills in the field of engineering technology
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be able to: Knowledge of technical skills in the field of industrial safety, measurement, filing, carpentry, welding, mechanical operation, sanitary engineering and the basics of electrical work
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Industrial safety workshop(2 hours) - Measurement &Marking workshop(3 hours) - Filing workshop (10 hours) - Carpentry workshop(10 hours) - Welding workshop(10 hours) - Casting workshop(10 hours) - Machining workshop(10 hours) - plumbing workshop(10 hours) - Electrical workshop (10 hours)
Course Description	The engineering workshop course focuses on identifying risks in the work environment and industrial safety guidelines. And training on how to measure and determine, and the use of filing tools and their work. Learn about the types of wood used in carpentry, the process of shaping it, and the use of carpentry tools and machines. Training in welding work, its types, and the process of joining metals by welding. Training on various casting works and training on mechanical operation, which includes turning, milling, and grinding. Training on pipe knowledge, how to connect, sanitary engineering works, and training on the basics of electrical workshops.

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, and demonstrate concepts with appropriate (and where possible practical) examples Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **60** **In class tests** **4**	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 36** **Preparation for tests** **24** **Homeworks** **26**	86	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	9	5% (5)	all	LO #1, 2, 3, and 9
	Assignments	9	15% (15)	All	LO # 1, 2, 3, 4, 5 and 9
Summative assessment	**Midterm Exam**	2	30% (30)	7	LO # 1-5
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Industrial safety workshop & Measurement and marking workshop
Week 2	Filing workshop
Week 3	Filing workshop
Week 4	Carpentry workshop
Week 5	Carpentry workshop
Week 6	Welding workshop
Week 7	Welding workshop
Week 8	plumbing workshop
Week 9	plumbing workshop

Week 10	Machining workshop
Week 11	Machining workshop
Week 12	Casting workshop
Week 13	Casting workshop
Week 14	Electrical workshop
Week 15	Electrical workshop
Week 16	**Final Exam**

<table>
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<tr><td>Required Texts</td><td>Abd fares , Engineering workshops</td><td>Yes</td></tr>
<tr><td>Recommended Texts</td><td>Technology of Machine Tools , Steve F. Krar & J. William Oswald ,McGraw-Hill Publishing Company , fourth Edition , 1991</td><td>No</td></tr>
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