Student Guidebook| 2023-2024 | الدليل الإرشادي للطلبة

University of Anbar
جامعة الانبار

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

بكالوريوس - هندسة ميكانيك

Table of Contents |جدول المحتويات

1. About The Mechanical Engineering department

The Mechanical Engineering department expands the frontier of human knowledge in the discipline of mechanical engineering through fundamental and applied research conducted by faculty and students. It applies the principles of mechanical engineering to bear on important problems of national and regional, implication: mechanical design, thermal sciences and production. The outcomes for the Mechanical Engineering Program were chosen so that the ME graduates will be prepared to meet the program objectives. Thus, graduates of the Mechanical Engineering Program will have:

1. The ability to apply knowledge of mathematics, science, and engineering to design and conduct experiments, as well as to analyze and interpret data;

2. The ability to identify, formulate, solve engineering problems or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;

3. To understand the impact of engineering solutions in a global, economic, environmental, and societal context.

4. The ability to communicate effectively and engage in life-long learning.

5. The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

2. Vision Statement

The Department of Mechanical Engineering endeavours to be one of the leading Mechanical Engineering Programs in Iraq and the Arab world.

3. Mission Statement

The Department of Mechanical Engineering's mission is to educate, prepare, encourage, and advise students in order for them to excel as professionals and to provide graduates with advanced knowledge and skills as well as high quality engineering education.

4. Program Specification

Program code:	B.Sc. -MEC	**ECTS**	240
Duration:	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

5. Goals

The Mechanical Engineering program is providing graduates with solid practical and professional knowledge to excel in this field of engineering. Within a few years after graduating, our students will:

1. To provide a high quality of mechanical engineering education via outstanding teaching, innovative curriculum, and career-relevant training programs.
2. To encourage and promote execution innovative research and find solutions for the complex problems related to mechanical engineering.
3. To prepare mechanical engineers adhered to the professional ethics, applicable laws and the accepted standards to prevent corruption and deviation.
4. To promote the quality of education and scientific research for the members (academic staff and employees) of the department.
5. To offer mechanical engineering consulting services that satisfy a community's and an institution's requirements.

6. Student Learning Outcomes (SLOs)

SLO-1: Technological Skills

The graduate makes appropriate use of technologies to communicate, collaborate, solve problems, make decisions, and conduct research, as well as foster creativity and life-long learning. The graduate is able to use state-of-the-art technological resources and tools and keeps up on advancements in her or her field of study and/or practice.

SLO-2: Problem Solving Abilities

The graduate is able to creatively solve problems from both analytic and applied perspectives using multiple approaches, integrating sciences, engineering, and the humanities. The graduate is able to recognize, incorporate and adapt to the limitations and consequences of applying various problem solutions.

SLO-3: Innovation and Design

The graduate often makes discussions and observations that lead to new ideas or hypotheses. He or she formulate novel solutions while moving beyond the conventional to new methods blending creative and practical approaches, constructions and designs which may involve pioneering applications along the interface of engineering and modern technology. The graduate has the ability to create highly sophisticated designs and implement them which are considered state-of-the practice in his or her field.

SLO-4: Research Abilities

The graduate is able to collect and process data, information and knowledge to answer specific questions or generate new conceptual models and hypotheses. The graduate evaluates these models and hypotheses using the appropriate experimental, mathematical, and statistical approaches.

SLO-5: Leadership

The graduate is able to articulate a vision or goal in such a manner as to promote collaboration and successful implementation. The graduate displays a willingness to overcome adversity and work diligently in pursuit of goals, thus serving as a role model for others.

SLO-6: Communication

The graduate employs an understanding of audience, purpose, and context to communicate effectively in a range of situations using appropriate media while displaying a significant aptitude for presenting scientific and technical materials to diverse audiences.

SLO-7: Human Resources and Interactions

The graduate is able to work either independently or in diverse groups to effectively and efficiently to respond to academic and work requirements.

SLO-8: Engagement

The graduate uses his or her knowledge and skills, including those associated with engineering and applied science, to make a positive difference on issues of public concern.

SLO-9: Ethical Reasoning, Behaviour and Professionalism

The graduate recognizes ethical issues, considers multiple points of view, and uses critical ethical reasoning to determine the appropriate behaviour to follow. The graduate thus demonstrates a high level of integrity and a positive work ethic combined with a thorough understanding of the ethical implications and obligations associated with the practice of all the fields of mechanical engineering.

7. Academic Staff

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8. Credits, Grading and GPA

7. 1. Credits

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

7. 2. Grading

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

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

7. 3. GPA

Calculation of the Cumulative Grade Point Average (CGPA):

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

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

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

8. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name in Arabic	Module Name in English	SSWL	USSWL	ECTS	Type	Pre-request
ENG 003	الرياضيات1	Calculus I	63	87	6	B	
ENG 006	الميكانيك الهندسي1 (سكوني)	Engineering Mechanics I (Static)	63	87	6	C	
ENG 001	الفيزياء	Physics	78	47	5	B	
MEC 001	أساسيات عمليات التصنيع	Principles of Manufacturing Process	93	57	6	C	
UOA 001	اللغة العربية1	Arabic Language I	33	17	2	S	
UOA 005	حقوق الإنسان والديمقراطية	Human Rights and Democracy	33	17	2	S	
UOA 007	علوم الحاسوب1	Computer Science I	48	27	3	S	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name in Arabic	Module Name in English	SSWL	USSWL	ECTS	Type	Pre-request
ENG 004	الرياضيات2	Calculus II	63	87	6	B	ENG 003
ENG 005	مبادئ الهندسة الكهربائية	Fundamentals of Electrical Engineering	78	72	6	C	
ENG 007	الرسم الهندسي	Engineering Drawing	93	32	5	C	
ENG 002	الكيمياء	Chemistry	78	47	5	B	
MEC 002	الميكانيك الهندسي2 (حركي)	Engineering Mechanics-II(Dynamics)	48	52	4	C	ENG 006
MEC 003	برمجة الحاسوب	Computer Programming	48	2	2	C	

UOA 003	اللغة الانكليزية1	English Language I	33	17	2	S	

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name in Arabic	Module Name in English	SSWL	USSWL	ECTS	Type	Pre-request
ENG 08	الرياضيات3	Calculus-III	63	87	6	B	ENG 004
ENG 12	أخلاقيات ومهارات القيادة	Ethics and Leadership Skills	33	17	2	S	
MEC 04	ديناميك الحرارة1	Thermodynamics I	78	47	5	C	
MEC 05	ميكانيك الموائع1	Fluid Mechanics I	78	22	4	C	
MEC 06	مقاومة المواد1	Strength of Materials I	78	22	4	C	ENG 006
MEC 07	الرسم الميكانيكي	Mechanical drawing	78	47	5	C	ENG 007
UOA 001	اللغة العربية2	Arabic Language II	33	17	2	S	
UOA 05	جرائم حزب البعث في العراق	The Crimes of Baath Regime in Iraq	33	17	2	S	

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name in Arabic	Module Name in English	SSWL	USSWL	ECTS	Type	Pre-request
ENG 009	الرياضيات4	Calculus-IV	63	87	6	B	ENG 008
MEC 008	ديناميك الحرارة2	Thermodynamics II	78	22	4	C	MEC 004
MEC 009	ميكانيك الموائع2	Fluid Mechanics II	63	37	4	C	MEC 005
MEC 010	مقاومة المواد2	Strength of Materials II	63	37	4	C	MEC 006
MEC 011	هندسة المعادن	Engineering Metallurgy	63	37	4	C	MEC 001
MEC 012	مكائن كهربائية	Electrical Machines	63	12	3	C	ENG 005
UOA 004	اللغة	English Language II	33	17	2	S	

	الانكليزية2						
UOA 008	علوم الحاسوب2	Computer Science II	48	27	3	S	

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name in Arabic	Module Name in English	SSWL	USSWL	ECTS	Type	Pre-request
ENG 010	إحصاء هندسي	Engineering Statistics	48	52	4	B	ENG 009
MEC 013	انتقال الحرارة1	Heat Transfer-I	78	72	6	C	MEC 008, MEC 009
MEC 014	نظرية المكائن1	Theory of Machines-I	78	72	6	C	MEC 002
MEC 015	تحليلات هندسية	Engineering Analysis	63	62	5	B	ENG 009
MEC 016	محركات الاحتراق الداخلي	Internal Combustion Engines	78	47	5	C	MEC 008
MEC 017	ديناميك الغازات	Gas Dynamics	63	37	4	C	MEC 008, MEC 009

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name in Arabic	Module Name in English	SSWL	USSWL	ECTS	Type	Pre-request
ENG 011	الطرق العددية الهندسية	Engineering Numerical Methods	78	47	5	B	ENG 009
MEC 018	انتقال الحرارة2	Heat Transfer-II	78	72	6	C	MEC 013
MEC 019	نظرية المكائن2	Theory of Machines-II	78	72	6	C	MEC 014
MEC 020	عمليات التصنيع	Manufacturing Processes	63	62	5	C	MEC 011
MEC 021	الطاقة المتجددة والمستدامة	Renewable and Sustainable energy	48	52	4	C	MEC 013
MEC 022	الهندسة الصناعية والتحليل	Industrial Engineering and Economic Analysis	63	37	4	C	ENG 009

	الاقتصادي						

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name in Arabic	Module Name in English	SSWL	USSWL	ECTS	Type	Pre-request
MEC 023	تصميم أجزاء المكائن1	Design of Machine Elements-I	63	62	5	C	MEC 010
MEC 024	تكييف الهواء	Air Conditioning	78	72	6	C	MEC 018
MEC 025	الاهتزازات الميكانيكية	Mechanical Vibrations	78	47	5	C	MEC 019
MEC 026	مواد هندسية	Engineering Materials	48	77	5	C	MEC 011
MEC 01E	ديناميكا الموائع الحسابية	Computational Fluid Dynamics	78	47	5	E	MEC 008, MEC 015, ENG 011
MEC 027	مشروع تخرج1	Final Year Project-I	78	22	4	C	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Module Code	Module Name in Arabic	Module Name in English	SSWL	USSWL	ECTS	Type	Pre-request
MEC 028	تصميم أجزاء المكائن2	Design of Machine Elements-II	63	62	5	C	MEC 023
MEC 029	تثليج	Refrigeration	78	47	5	C	MEC 008
MCE 030	أنظمة السيطرة والقياسات	Measurement and Control Systems	93	57	6	C	MEC 019
MEC 031	محطات القدرة	Power Plants	63	87	6	C	MEC 008
MEC 02E	طريقة العناصر المحددة	Finite Element Method	48	52	4	E	MEC 010, MEC 015
MEC 032	مشروع تخرج2	Final Year Project-II	78	22	4	C	

9. Contact

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Program Coordinator:

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1- Calculus I

Module Information معلومات المادة الدراسية					
Module Title	Calculus I			**Module Delivery**	
Module Type	B			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENG 003				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Ahmed Ali Najeeb		**e-mail**	Ashaab_1977@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Dr. Ahmed Ali Najeeb		**e-mail**	Ashaab_1977@uoanbar.edu.iq	
Peer Reviewer Name	Dr. MazinYaseen		**e-mail**	mazin76eng@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. To develop mathematical skill so that students are able to sketch the graph of various functions and evaluates Limits by using different techniques including L'Hopital's Rule. 2. To apply mathematical methods and principals in solving various derivative problems from Engineering fields, involving applications of derivatives.

	3.To demonstrate algebraic facility with algebraic topics including linear, quadratic, exponential, logarithmic, and trigonometric functions, 4. To compute derivative and anti- derivative of algebraic, trigonometric, inverse trigonometric, exponential, logarithmic, and apply them to solve problems in a wide range of engineering applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To calculate Tangent line and slope problems. 2. Apply Drawing of functions. 3. Estimate Limit and continuity of functions. 4. To find Limits at infinity, horizontal asymptote, infinite limits, vertical asymptotes and drawing of functions. 5. Derivative of functions and rates of change. Differentiation of polynomials, product and quotient rules. 6. Derivatives of exponential, logarithmic, and trigonometric functions. 7. Chain rule and implicit differentiations. 8. Applications of differentiation maximum and minimum values (the mean value theorem). 9. Derivative of hyperbolic functions and indeterminate forms and L'hospital's rule. 10. Optimization problems and anti-derivative of functions.
Indicative Contents المحتويات الإرشادية	Tangent line and slope, Drawing of functions, Limit and continuity of functions, Derivative of functions, Applications of differentiation.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The most important strategies that will be adopted in delivering this module are: - Allow students to actively participate in the learning process with class discussions and exercises that support the initiative. - Incorporate flexible seating into my classroom - Knowledge application and extended critical thinking - Do Summative assessments occurs at end of chapter - Doformative assessmentoccurs through chapter to covers complete content areasCase-Based Learning.

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

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2, 4, 7, 12, 13	LO # 1, 2, 3, 8, 9
	Online Assignments (HW)	3	6% (6)	3, 5, 11	LO # 4, 5, 6
	Onsite Assignments	3	5% (5)	6, 8, 10	LO # 7, 8
	Report	1	4% (4)	14	LO # 5, 7, 9
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1 - 7
	Final Exam	3 hr	50% (50)	16	LO #1 - 10
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Functions
Week 2	Functions
Week 3	Limits
Week 4	Limits
Week 5	Differentiation rules
Week 6	Differentiation rules
Week 7	The Chain Rule, Implicit Differentiation
Week 8	Applications of differentiation
Week 9	Applications of differentiation

Week 10	Exponential and logarithmic functions.
Week 11	Trigonometric functions and their derivatives
Week 12	Hyperbolic functions and their derivatives
Week 13	Advanced Applications of differentiation
Week 14	Derivative and anti- derivative functions
Week 15	Derivative and anti- derivative functions
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Stewart, J., Clegg, D. K., & Watson, S. (2020). Calculus: early transcendentals. Cengage Learning.	
Recommended Texts	. Thomas, G. B., Haas, J., Heil, C., & Weir, M. (2018). Thomas' Calculus. Pearson Education Limited.	
Websites		

Grading Scheme
مخطط الدرجات

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

2- Engineering Mechanics I (Static)

Module Information
معلومات المادة الدراسية

Module Title	Engineering Mechanics I (Static)		**Module Delivery**	
Module Type	C		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENG 006			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGI	**Semester of Delivery**	1	
Administering Department	MEC	**College**	ENG	
Module Leader	Dr. Ahmed N. Uwayed	**e-mail**	Ahmed.noori@uoanbar.edu.iq	
Module Leader's Acad. Title	Assit. Prof.	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ahmed N. Uwayed	**e-mail**	Ahmed.noori@uoanbar.edu.iq	
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Scientific Committee Approval Date	01/06/2023	**Version Number**	1	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	ENG 001 Physics	**Semester**	1

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

Module Aims	1. To understand the different types of Force systems and recognize the best way to deal with each one. 2. To determine the resultant of multi Forcesof different types of forces

أهداف المادة الدراسية	and moments. 3. To study and analyze the Equilibrium of force system of particles 4. To study and analyze the Equilibrium of a Rigid Body 5. To understand and solve the forces within Truss members using two types of solutions: method of joint and sections 6. To determine the forces within Frames 7. To locate the centroid and mass of gravity of different shapes. 8. To determine the Moment of inertia of many geometries. 9. To deal with the friction force between two or more bodies in contact.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. determine the resultant of Coplanar forces in two and three dimensions 2. Introducing the concept of the free-body diagram for a particle. 3. Show how to solve particle equilibrium problems using the equations of equilibrium. 4. Provide a method for finding the moment of a force about a specified axis. 5. Present methods for determining the resultants of non-concurrent force systems. 6. Develop the equations of equilibrium for a rigid body. 7. Introduce the concept of the free-body diagram for a rigid body. 8. Show how to determine the forces in the members of a truss using the method of joints and the method of sections. 9. Analyze the forces acting on the members of frames and machines composed of pin-connected members. 10. Show how to determine the location of the center of gravity and centroid for a system of discrete particles and a body of arbitrary shape. 11. Develop a method for determining the moment of inertia for an area. 12. introduce the product of inertia and show how to determine the maximum and minimum moments of inertia of an area 13. Introduce the concept of dry friction.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Force system: Resultant of forces on particles in two and three dimensions. 2. Equilibrium of particles: Free-Body-diagram, equation of equilibrium. 3. Force System Resultants**:** resultant of force and moment on rigid body, couples, moment about point in two and three dimensions, moment about axis. 4. Equilibrium of a Rigid Body: Free-Body Diagrams, Equations of Equilibrium. 5. Trusses: method of joint and sections 6. Frames: Free-Body Diagrams, Equations of Equilibrium. 7. Centroid:Centroids of Lines, Areas, and Volumes. 8. Moment of inertia: Parallel-Axis Theorem for an Area, Radius of Gyration of an Area,Moments of Inertia forComposite Areas. 9. Friction:Mechanism of Dry Friction, Static Friction.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to: 1. Encourage students' participation in the exercises 2. 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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	3, 5, 7, 11, 13	LO # 1, 3, 5, 8, 11

	Online Assignments (HW)	**3**	**6% (6)**	2, 8, 12	LO # 2, 6, 12
	Onsite Assignments	**3**	**5% (5)**	4, 6, 14	LO # 4, 7, 9
	Report	**1**	**4% (4)**	14	LO # 10
	Lab				
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1 - 7
	Final Exam	**3 hr**	**50% (50)**	16	LO # 1 - 13
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Force system
Week 2	Force system
Week 3	Equilibrium of particles
Week 4	Equilibrium of particles
Week 5	Force System Resultants
Week 6	Force System Resultants
Week 7	Equilibrium of a Rigid Body
Week 8	Equilibrium of a Rigid Body
Week 9	Trusses: method of joint and sections
Week 10	Trusses: method of joint and sections
Week 11	Frames
Week 12	Frames
Week 13	Centroid
Week 14	Moment of inertia
Week 15	frictions
Week 16	**Final Exams**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	R. C. Hibbeler, "Engineering Mechanics - Statics " 13th Edition, 2012	Yes
Recommended Texts	J.L Meriam and L.G. Kraige (2016) Engineering mechanics statics	Yes
Websites		

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval
المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		8/6/2023	
Peer Reviewer Approval		8/6/2023	
Scientific Committee Member Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		8/6/2023	

3- Physics

Module Information معلومات المادة الدراسية		
Module Title	Physics	Module Delivery
Module Type	B	☒ Theory

Module Code	ENG 001			☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Sattar Abed Mutlag		**e-mail**	satmutt1961@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Dr. Sattar Abed Mutlag		**e-mail**	satmutt1961@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Diyar Ismael Ahmed		**e-mail**	diyar.ismael@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The aims are to enable students to: 1. acquire scientific knowledge and understanding of scientific theories and practice 2. develop a range of experimental skills, including handling variables and working safely 3. use scientific data and evidence to solve problems and discuss the limitations of scientific methods 4. communicate effectively and clearly, using scientific terminology, notation and conventions 5. understand that the application of scientific knowledge can benefit people and the environment 6. enjoy science and develop an informed interest in scientific matters

	which support further study
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the translational motion of a single particle in terms of position and inertial frames, inertia, velocity, acceleration, linear momentum and force. 2. Describe the rotational motion of a rigid body using the concepts of rotation angle, angular velocity, angular acceleration, angular momentum, moment of inertia, and torque. 3. Identify the forces acting on ordinary mechanical systems to be gravity and electromagnetics (Drag force, frictional force, normal force, etc.). 4. State the fundamental laws of kinematics and dynamics of rotational motion of a rigid body and use them to solve problems on simple rotational motion. 5. Analyses the translational and rotational motion using a scalar approach based on the concepts of work, conservative and non-conservative forces, potential energy and conservation of mechanical energy. 6. State the two conditions of static and dynamic equilibrium of a point particle and a rigid body, and use them to solve problems of static equilibrium. 7. Define and calculate the following parameters of oscillatory and wave motion: amplitude, period, frequency, angular frequency, speed of a wave, energy transported, Power and intensity; 8. Describe Simple Harmonic Motion qualitatively and quantitatively. 9. Recognize and analyses some wave characteristics: principle of superposition, interference, diffraction, reflection, transmission, refraction, standing waves and Resonance. 10. Define what is meant by: temperature, specific and molar heats of capacity.
Indicative Contents المحتويات الإرشادية	
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials 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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2, 4, 6, 12, 14	LO # 1, 2, 4, 8, 9
	Online Assignments (HW)	2	4% (4)	5, 11	LO # 3, 7
	Onsite Assignments	5	5% (5)	3, 7, 10, 12, 13	LO # 2, 3, 5, 8, 10
	Report				
	Lab	3	6% (6)	2, 6, 11	LO # 1, 4, 9
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1 - 7
	Final Exam	3 hr	50% (50)	16	LO # 1 - 10
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Physics and measurement: Standards of length, mass and time, dimensional analysis.
Week 2	Physics and measurement: Standards of length, mass and time, dimensional analysis.
Week 3	Motion in one dimension: displacement, velocity, acceleration, motion diagrams.
Week 4	Motion in one dimension: displacement, velocity, acceleration, motion diagrams.
Week 5	Vectors: coordinate systems, vector and scalar quantities, some properties of vectors, adding

	vectors, subtracting vectors, multiplying a vector by a scalar
Week 6	Vectors: coordinate systems, vector and scalar quantities, some properties of vectors, adding vectors, subtracting vectors, multiplying a vector by a scalar
Week 7	Motion in two dimensions: the position, velocity and acceleration vectors.
Week 8	Motion in two dimensions: the position, velocity and acceleration vectors.
Week 9	The laws of motion: Newton's first law and inertial frames, Newton's second law, Newton's third law, forces of friction.
Week 10	The laws of motion: Newton's first law and inertial frames, Newton's second law, Newton's third law, forces of friction.
Week 11	Other applications of Newton's laws: examples of some applications, non-uniform circular motion.
Week 12	Fluid Mechanics: Pressure and density, Equations of Fluid static; Equations of fluid dynamics: Continuity and Bernoulli's equations.
Week 13	Temperature: thermometers and the Celsius temperature scale, the constant-volume gas thermometer and the absolute temperature scale.
Week 14	Energy and energy transfer: systems and environment, work done by a constant force, the scalar product of two vectors, work done by vary force.
Week 15	Energy and energy transfer: systems and environment, work done by a constant force, the scalar product of two vectors, work done by vary force.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**-**
Week 2	Measurements and Data Analysis
Week 3	Measurements and Data Analysis
Week 4	Verification of Ohm's Law
Week 5	Verification of Ohm's Law

Week 6	Temperature Dependence of Electrical Resistance
Week 7	Temperature Dependence of Electrical Resistance
Week 8	The Relationship between the Fusing Current of a conducting wire and its diameter
Week 9	The Relationship between the Fusing Current of a conducting wire and its diameter
Week 10	Electrical conduction through semiconductor
Week 11	Electrical conduction through semiconductor
Week 12	Determination of Dielectric Constant
Week 13	Determination of Dielectric Constant
Week 14	**Assessment**
Week 15	**-**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	R.D. Knight, Physics for Scientists and Engineers, 2nd ed., Pearson 2008	Yes
Recommended Texts		
Websites		

Grading Scheme
مخطط الدرجات

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

(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

4- Principles of Manufacturing Process

Module Information معلومات المادة الدراسية		
Module Title	Principles of Manufacturing Process	**Module Delivery**
Module Type	C	☒ **Theory**

Module Code	MEC 001			☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	UGI	**Semester of Delivery**	1	
Administering Department	MEC	**College**	ENG	
Module Leader	Dr. Kadhum Ahmed Abed	**e-mail**	kadhum1968@uoanbar.edu.iq	
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Kadhum Ahmed Abed	**e-mail**	kadhum1968@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Zinah J. Ahmed	**e-mail**	Zinah.j.ahmed@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	none	**Semester**	
Co-requisites module	none	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aim1s أهداف المادة الدراسية	1. To understand the principles of major manufacturing processes. 2. To recognize the standard processes used to produce products. 3. To know the optimal process to produce products.
Module Learning Outcomes	1. Understand the principle of manufacturing engineering. 2. Obtain important information about the iron ores and how can obtain the different types of iron and steel. 3. Classify materials and their improvement properties.

مخرجات التعلم للمادة الدراسية	4. Know the different types of machining processes.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Engineering materials mechanical properties,tests, behavior, (10hrs) Manufacturing processes: casting, welding, forming, working, joining processes. (10hrs) Concept of machining processes, turning, drilling milling, and grinding. Metrological concepts. (6hrs) Manufacturing processes: casting, welding, forming, working, joining processes. (10hrs) Concept of machining processes, turning, drilling milling, and grinding. (8hrs) Turning process, types of cutting, cutting parameters calculation. (8hrs) Milling process planning of inspection. Describe types of inspection. (8hrs)

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2, 4, 6, 12, 14	LO # 1, 2, 4
	Online Assignments (HW)	2	4% (4)	5, 11	LO # 1, 3
	Onsite Assignments	5	5% (5)	3, 7, 10, 12, 13	LO # 2, 3, 4
	Report				
	Lab	3	6% (6)	2, 6, 11	LO # 1, 3, 4
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1 - 3
	Final Exam	3 hr	50% (50)	16	LO # 1 - 4
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Engineering materials
Week 2	introduction to entrepreneurship,
Week 3	introduction to entrepreneurship,
Week 4	Manufacturing processes: casting, welding processes.
Week 5	Manufacturing processes: forming, working processes.
Week 6	Manufacturing processes: joining processes.
Week 7	Hand work and hand tools
Week 8	Hand work and hand tools
Week 9	Concept of machining processes, turning, and drilling.
Week 10	Concept of machining processes, milling, and grinding.
Week 11	Metrological concepts.
Week 12	Industrial safety.
Week 13	Progress Exam 2
Week 14	Turning process
Week 15	Milling process
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Casting process, sand casting mold.
Week 2	Welding process.
Week 3	Turning process.
Week 4	Milling process.
Week 5	Carpenter workshop
Week 6	Grinding process
Week 7	Exams

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	RajenderSingh,Third Edition, 2006, Introduction to manufacturing process andWorkshop Technology	Yes
Recommended Texts	Fundamentals of Modern Manufacturing by Groover Manufacturing Engineering and Technology by Kalpakjian Materials and Processes in Manufacturing by E.P Degarmo Process and Materials of manufacture by F.A Lindberg	No
Websites		

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

Note: MarksDecimal 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 Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

5- Arabic Language I

Module Information معلومات المادة الدراسية		
Module Title	Arabic Language I	**Module Delivery**
Module Type	S	☒ **Theory** ☐ **Lecture** ☐ **Lab**
Module Code	UOA 001	

ECTS Credits	2		☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
SWL (hr/sem)	50			
Module Level	UGI	**Semester of Delivery**		1
Administering Department	MEC	**College**	ENG	
Module Leader	Dr. MuannaW.Naji	**e-mail**	muanna.naji@uoanbar.edu.iq	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor		**e-mail**		
Peer Reviewer Name	Dr. MajedHadiTalal	**e-mail**	mqaessy@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This course aims to build students' knowledge and competence in the Arabic language, rhetoric, and Arabic literature of all kinds, to increase their ability to appreciate literature and develop their awareness of its concepts through the study of poetry, novels, and short stories. Story. C- thinking skills: 1. Work on developing the intellectual property of the student.

	2. Ensuring the personal development of the student at the academic level.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Develop academic essay writing proficiency 2. Apply reading skills 3. Expand academic vocabulary through reading 4. Improve critical thinking skills 5. Developing the student's intellectual property in the field of the Arabic language, to acquire verbal and actual ability and skill.
Indicative Contents المحتويات الإرشادية	Study the text of the Quran and analyze its language, spelling, and rules. [5 hrs] The rules of writing the hamza, Written verbatim by Arab and of number and numerical adjective. [15 hrs] Punctuation. [5 hrs] the method of detection for words in Arabic Dictionaries, the applications of grammar and language- the actor and his deputy, Debutante and the news Acts missing, The case and exception. [10 hrs] Ancient literary studies, Definition of literature and its importance, Ages historical Arabic literature – Modern Literary Studies, Study the texts of poetic eras (pre-Islamic, Islamic, Umayyad, Abbasid, Andalusia), Study of ancient prose texts (speeches, messages), examine the texts of modern poetry and contemporary, examine the texts of modern prose (drama, novel, article). [10hrs] Rhetoric study. [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Raise the students' linguistic level, and build their intellectual progress by highlighting the importance of the Arabic language in their lives as their mother tongue.

Student Workload (SWL)

الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2, 4, 7, 12, 13	LO # 1, 2, 3, 4
	Online Assignments (HW)	3	6% (6)	3, 5, 11	LO # 1, 3, 4
	Onsite Assignments	3	5% (5)	6, 8, 10	LO # 1, 2, 3
	Report	1	4% (4)	14	LO # 5
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1 - 3
	Final Exam	3 hr	50% (50)	16	LO # 1 - 5
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Arabic grammar
Week 2	Arabic grammar
Week 3	Arabic grammar, Arabic grammar, its importance and place in the language.
Week 4	Arabic grammar, Hamza al-Wasl sites and parts.
Week 5	Dictionaries of the Arabic language, And ways to reveal the meanings of words in dictionaries

Week 6	The rules of number and number, the rule of distinguishing the number and its formulation, the definition of the number and how to read it
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit
Week 8	Arabic literature / the most prominent features and characteristics of Arabic literature.
Week 9	Arabic literature / Historical eras of Arabic literature.
Week 10	Arabic literature / **The novel and its elements.**
Week 11	Rhetoric/Truth and metaphor.
Week 12	Rhetoric/The arts of rhetoric
Week 13	Rhetoric/The arts of rhetoric
Week 14	Rhetoric/Poetry / Muallaqat poets and some contemporary poets.
Week 15	Rhetoric/Poetry / Muallaqat poets and some contemporary poets.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Lectures in the Arabic language.	Yes
Recommended Texts	Meanings of grammar / Prof. Dr. Fadel Al-Samarrai	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

6- Human Rights and Democracy

Module Information معلومات المادة الدراسية		
Module Title	Human Rights and Democracy	**Module Delivery**

Module Type	S	☒**Theory** ☐**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**
Module Code	UOA 005	
ECTS Credits	2	
SWL (hr/sem)	50	

Module Level	UGI	**Semester of Delivery**	1
Administering Department	MEC	**College**	ENG
Module Leader	Dr. Muanna W.Naji	**e-mail**	muanna.naji@uoanbar.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	1/06/2023	**Version Number**	1

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This course is designed to give the student a definition of human rights and democracy idiomatically, the legitimacy of the origin of the right in the view of Islamic law, the pillars of the right and its types, personal freedom, intellectual freedom, economic rights and freedoms, Islam and slavery, the goals of human rights, the use of freedom and the general legitimate right, the right of a Muslim to His Muslim brother, the rights of parents, the right neighbor, the right of women, human rights in the divine religions, religious tolerance in Islam.Thinking skills: 1. Work on developing the intellectual property of the student.

	2. Ensuring the student's personal development at the academic level. 3. Drawing ways of intellectual success to achieve personality building on the (family, social, academic, and professional) levels. 4. Learn the art of dealing with the above character building levels.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the concept of "human rights and democracy". 2. The status of human rights and freedoms in Islam. 3. Define and describe the relationship between human rights and democracy.
Indicative Contents المحتويات الإرشادية	**Course Topics:** 1. Introducing human rights, democracy and the principle of freedoms. [Two hours] 2. The origin of right and freedom from the point of view of Islamic law, and the general concept. [3 hours] 3. Elements and types of human rights and freedoms. [8 hours] 4. Economic and political rights and freedoms. [3 hours] 5. Islam and slavery. [1 hour] 6. The objectives of human rights and democracy. [4 hours] 7. The project of using freedom and public right. [2 hours] 8. The right of a Muslim and humanity. [2 hours]

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Raise the intellectual level of students, which is the importance of human rights when it is reflected on the individual, society and the state

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2, 4, 7, 12, 13	LO # 1, 2, 3
	Online Assignments (HW)	3	6% (6)	3, 5, 11	LO # 1, 2, 3
	Onsite Assignments	3	5% (5)	6, 8, 10	LO # 1, 2, 3
	Report	1	4% (4)	14	LO # 3
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1 - 2
	Final Exam	3 hr	50% (50)	16	LO # 1 - 3
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	The Universal Declaration of Human Rights and other countries speak of human rights over the individual, society and the state. Clarifying the meaning of right, duty, responsibility and guarantees of human rights before the judiciary.
Week 2	Sections of human rights in law and Sharia, statement of the rights of God Almighty and guarantees of human rights. It includes sections of the rights of the individual over society such as the right to protect life, honor and mind, and the right to protect money and property.
Week 3	The right to equality before the law and the right to equality and justice among individuals. The right of the individual to work, learn, express his opinion and freedom of thought.
Week 4	Clauses of preserving the freedoms contained in the Universal Declaration of Human Rights, and the impact of the study. Explanation of the meaning of freedom and democracy and the types and divisions of freedoms.
Week 5	Freedoms related to the material rights of an individual, including personal freedom. Freedoms related to the material rights of an individual, including civil liberties.
Week 6	Freedom of movement, residence and ownership. Freedoms related to the moral rights of the individual.
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit.
Week 8	Statement of the sanctity of the home and the right of the individual to move.

	The rights of society over the individual include the right to freedom of belief and life, the right to honor protection, work and education.
Week 9	Ensuring equality before the law and the judiciary, freedom of opinion and thought, and protection of the mind The right to protection of property and travel.
Week 10	The rights of the individual over the individual, including social rights. Financial rights and its importance in ensuring social life.
Week 11	Finally, emphasizing the importance of commitment to applying human rights and their impact on the individual, society and the state.
Week 12	Freedom of belief, freedom of opinion and expression, and freedom of education. Political freedom, the culture of dialogue and its impact on proving freedom of opinion.
Week 13	One of the heroes of enslaving people and proving freedom for individuals. Highlighting the freedom of women and beautifying them in adhering to the teachings of faith and proving the importance of applying the principle of freedoms among individuals.
Week 14	Individual and international interest in applying the principle of freedoms. Rights and freedoms are two interrelated principles. The role of the individual, society and the state in establishing the principle of human rights and freedoms. And a statement of the negatives in the event of non-application of the principle of freedoms.
Week 15	Iraq and international treaties in the field of human rights and Iraq's position in eliminating dictatorship and racism and work to preserve public rights and public money and eliminate financial and administrative corruption.
Week 16	Preparatory week before the final Exam.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Lectures on human rights, freedoms and democracy	Yes
Recommended Texts	1 Human rights and freedoms. Prof. Dr. Mustafa Al-Zalmi. 2 Some contemporary published research involving human rights and books on the Universal Declaration of Human Rights	Yes
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings

	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب(قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: MarksDecimal 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 Approval المصادقة على وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
Scientific Committee Head Approval		**8/6/2023**	

7- Computer Science I

Module Information معلومات المادة الدراسية		
Module Title	Computer Science I	**Module Delivery**

Module Type	S			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	UOA 007			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	UGI	**Semester of Delivery**	1	
Administering Department	MEC	**College**	ENG	
Module Leader	Dr. Mohammed GhanemJehad	**e-mail**	mgjehad@uoanbar.edu.iq	
Module Leader's Acad. Title	Ass. Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**		
Peer Reviewer Name	Dr. Hamdi E. Ahmed	**e-mail**	hamdi.ahmed@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This course presents an overview of fundamental computer science topics. Overview topics include an introduction to computer components, computer hardware, operating systems, digitization of data, and application program (Microsoft office).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Analyze, design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs. 2. Identify problems and formulate solutions for systems. 3. Communicate effectively with a range of audience. 4. Work effectively as part of a team to develop and deliver quality software artifacts. 5. Design solutions using approaches that integrate ethical, social, legal, and economic responsibilities.

Indicative Contents المحتويات الإرشادية	- General Definitions System, Computer System, Hardware, Software, …etc. - Hardware Components. CPU, Main Memory, Input/ output Devices. - Operating system Windows - Microsoft Word - Microsoft PowerPoint

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	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/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	3,5,7, 11,13	LO # 1, 2, 4
	Online Assignments (HW)	2	4% (4)	4, 12	LO # 3, 5
	Onsite Assignments	5	5% (5)	2, 6, 8, 10, 14	LO # 1, 2, 3, 4
	Report				
	Lab	3	6% (6)	2, 6, 12	LO # 1, 2, 4
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1 - 3
	Final Exam	3 hr	50% (50)	16	LO # 1 - 5

Total assessment	**100%** **(100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Computer Fundamentals
Week 2	Computer Components – Hardware
Week 3	Computer Components – Software
Week 4	Computer Safety
Week 5	Operating Systems
Week 6	Operating System – Windows
Week 7	**Mid – term Exam**
Week 8	Introduction of Microsoft Word - File and Home Tab
Week 9	Page Layout and View Tap
Week 10	Insert Objects in Microsoft Word
Week 11	Illustrations and Header & Footer
Week 12	Introduction of Microsoft Power Point - File and Home Tab
Week 13	Design and View Tap
Week 14	Insert Objects Animations in Microsoft Power Point
Week 15	Animations in Microsoft Power Point
Week 16	**Final Exam**
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Windows 10
Week 2	Lab 2: Introduction of Microsoft Word
Week 3	Lab 3: Page layout
Week 4	Lab 4: View Tab
Week 5	Lab 5: Insert Objects in Microsoft Word
Week 6	Lab 6: Illustrations and Header & Footer
Week 7	Lab 7: More Options in Microsoft Word

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	أساسيات الحاسوب وتطبيقاته المكتبية (الجزء الأول) (الجزء الثاني) أ.م.د. زياد محمد عبود ، أ.د.غسان حميد عبد المجيد ، أ.م.د. أمير حسين مراد ، م. بلال كمال أحمد	Yes
Recommended Texts		
Websites		

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	

Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

8- Calculus II

Module Information
معلومات المادة الدراسية

Module Title	Calculus II			**Module Delivery**	
Module Type	B			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ENG 004				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Ahmed Ali Najeeb		**e-mail**	Ashaab_1977@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Dr. Ahmed Ali Najeeb		**e-mail**	Ashaab_1977@uoanbar.edu.iq	
Peer Reviewer Name	Dr. MazinYaseen		**e-mail**	mazin76eng@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	ENG 003Calculus -I	**Semester**	1
Co-requisites module	None	**Semester**	None

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To understand the formal definition of integral and to learn basic integration techniques 2. To study variousmethods of integration 3. To understand the relationship between integration and differentiation provided by the Fundamental Theorem of Calculus. 4. To Use various integration techniques to evaluate integrals. 5. To define the basic concepts and techniques of integration of polynomial, rational, transcendental and trigonometric functions. 6. To define and plot points given in polar coordinates and convert between the Cartesian and polar coordinates of a point.
Module Learning Outcomes	1. Evaluate indefinite and definite integrals. 2. Use definite integrals to solve application problems.

مخرجات التعلم للمادة الدراسية	3. Use various integration techniques to evaluate integrals. 4. Evaluate integrals of rational functions by partial fractions. 5. Define the basic concepts and techniques of integration of polynomial, rational, transcendental and trigonometric functions. 6. Compute an anti-derivative using integration by parts. 7. Describe a point on a graph using polar coordinates. 8. Plot a point given its polar coordinates. 9. Convert between polar and Cartesian coordinates. 10. Find the distance between points in polar form.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The most important strategies that will be adopted in delivering this module are: - Allow students to actively participate in the learning process with class discussions and exercises that support the initiative. - Incorporate flexible seating into my classroom - Knowledge application and Extended critical thinking - Do Summative assessments Occurs at end of chapter - Do Formative Assessment occurs through chapter to Covers complete content areasCase-Based Learning.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem)	150		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2, 4, 7, 12, 13	LO # 1, 2, 3, 8, 9
	Online Assignments (HW)	3	6% (6)	3, 5, 11	LO # 4, 5, 6
	Onsite Assignments	3	5% (5)	6, 8, 10	LO # 7, 8
	Report	1	4% (4)	14	LO # 5, 7, 9
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1 - 7
	Final Exam	3 hr	50% (50)	16	LO # 1 - 10
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Integral
Week 2	Integral
Week 3	Integration Techniques -Integration by Parts.
Week 4	Integration Techniques- Trigonometric Integrals.
Week 5	Integration Techniques- Partial Fractions
Week 6	Integration Techniques- Partial Fractions
Week 7	Applications of Integrals-Infinite Integral,Areas
Week 8	Applications of Integrals- Arc Length, Surface area
Week 9	Mid-Term Exam
Week 10	Applications of Integrals- Volumes (Disk, Washer, Shell)
Week 11	Polar Coordinates -Common Polar Coordinate Graphs
Week 12	Polar Coordinates - Tangents with Polar Coordinates, Curves defined by parametric equations.
Week 13	Sequences and Series

Week 14	Sequences and Series
Week 15	Sequences and Series
	Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Stewart, J., Clegg, D. K., & Watson, S. (2020). Calculus: early transcendentals. Cengage Learning.	Yes
Recommended Texts	2. Thomas, G. B., Haas, J., Heil, C., & Weir, M. (2018). Thomas' Calculus. Pearson Education Limited.	
Websites		

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval
المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	

Scientific Committee Member Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		8/6/2023	

9- Fundamentals of Electrical Engineering

Module Information

معلومات المادة الدراسية					
Module Title	Fundamentals of Electrical Engineering			Module Delivery	
Module Type	C			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	ENG 005				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGI		Semester of Delivery	2	
Administering Department	MEC		College	ENG	
Module Leader	SamehJassam Mohammed		e-mail	Naser.falahy@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Lecture		Module Leader's Qualification	MSc	
Module Tutor			e-mail		
Peer Reviewer Name	Dr. Naser Al-Falahy		e-mail	Naser.falahy@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of 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. 6. To perform mesh and Nodal analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	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. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law. 7. Identify the basic circuit elements and their applications. 8. Discuss the operations of sinusoid and phasors in an electric circuit. 9. Discuss the various properties of resistors, capacitors, and inductors. 10. Explain the two Kirchoff's laws used in circuit analysis. 11. Identify the capacitor and inductor phasor relationship with respect to voltage and current
Indicative Contents المحتويات الإرشادية	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. Anatomy of a circuit, Network reduction, Introduction to mesh and nodal analysis.

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.

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	**5**	**25% (25)**	2, 4, 6, 12,14	LO # 1, 3, 5, 10, 11
	Online Assignments (HW)	**2**	**4% (4)**	3, 13	LO # 2, 9

	Onsite Assignments	**5**	**5% (5)**	3, 5, 7, 10, 13	LO # 2, 4, 6, 7, 8
	Report				
	Lab	**3**	**6% (6)**	2, 7, 11	LO # 1, 6, 10
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1 -7
	Final Exam	**3 hr**	**50% (50)**	16	LO # 1 - 11
Total assessment			**100% (100 Marks)**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Introduction - Difference between Circuit Theory and Field Theory
Week 2	Basics of Network Elements
Week 3	Charge, Current and Voltage
Week 4	Power and Energy
Week 5	Resistance and Resistivity and Ohm's Law
Week 6	Kirchhoff's Laws
Week 7	Series Resistors and Voltage Division
Week 8	Parallel Resistors and Current Division
Week 9	Midterm Exam 1
Week 10	Wye-Delta Transformations
Week 11	Circuit Analysis - Nodal and Mesh

Week 12	Linearity and Superposition
Week 13	Source Transformations
Week 14	Thévenin and Norton Equivalents
Week 15	Maximum Power Transfer
Week 16	Midterm Exam 2

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	Material Covered
Week 1	Lab 1: Equipment Familiarization
Week 2	Lab 2: Ohm's Law
Week 3	Lab 3: Kirchhoff's Laws
Week 4	Lab 4: Series Resistors and Voltage Division
Week 5	Lab 5: Parallel Resistors and Current Division

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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

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

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

Module Approval

المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	

Scientific Committee Members Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		8/6/2023	

10- Engineering Drawing

Module Information معلومات المادة الدراسية		
Module Title	Engineering Drawing	**Module Delivery**

Module Type	C		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	ENG 007		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level:	UGI	**Semester of Delivery**	2
Administering Department	MEC	**College**	ENG
Module Leader	Mr. Rashaq Mohammed Abdullah	**e-mail**	Rashaqabdullah@uoanbar.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	MSc
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Arz Y. Qwam Alden	**e-mail**	arzrzayeg@uoanbar.edu.iq
Scientific Committee Approval Date	01/06/2023	**Version Number**	1

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The goals of this course are to enable students to: • To understand the basic principles of engineering drawing. • To learn how to use engineering drawing tools. • To have the knowledge of generating the pictorial views. • To have the knowledge of generating the projections. • To learn how to use certain software (CAD).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Recognize the value of engineering graphics as a language of communication. 2. Infer the nature of engineering graphics, the relationships between 2D and 3D environments. 3. Comprehend and deduce orthographic projections of an object. 4. Visualize wide variety of objects and drawing the missing views. 5. Comprehend and deduce section views.

	6. Produce three dimensional drawings utilizing CAD software.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Use drawing sheets. Use CAD software to learn computer graphics.

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	**1**	**3% (3)**	5	LO # 4
	Online Assignments (HW)	**7**	**7% (7)**	2, 4, 6, 8, 12, 13, 14	LO # 1, 2, 3, 4, 5, 6
	Onsite Assignments	**10**	**20% (20)**	2, 3, 4, 5, 6, 8, 11, 12, 13, 15	LO # 1, 2, 3, 4, 5, 6
	Report	**3**	**3% (3)**	3, 7, 14	LO # 1, 3, 5
	Lab	**7**	**7% (7)**	1, 3, 5, 7, 10, 12, 14	LO # 1, 2, 3, 4, 5, 6
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1 - 4
	Final Exam	**3 hr**	**50% (50)**	16	LO # 1 - 6
Total assessment			**100% (100 Marks)**		

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to engineering drawing
Week 2	Introduction to engineering drawing
Week 3	Using drawing tools
Week 4	Applied geometry
Week 5	Orthographic projection
Week 6	Orthographic writing I
Week 7	Orthographic writing II
Week 8	Pictorial sketching
Week 9	Pictorial sketching
Week 10	Orthographic reading
Week 11	Orthographic reading
Week 12	Dimensioning
Week 13	Dimensioning
Week 14	Section views
Week 15	Section views
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	-
Week 2	Introduction to Auto CAD
Week 3	Different Softwares for CAD
Week 4	Practice Exercises on Auto CAD Software
Week 5	Drawing Plan of a building in Auto CAD
Week 6	Drawing Plan of a building in Auto CAD
Week 7	Drawing Section and Elevation of a building in Auto CAD
Week 8	Drawing Section and Elevation of a building in Auto CAD

Week 9	Detailing of engines components
Week 10	Detailing of engines components
Week 11	Exercises on development of working drawings of engines in Auto CAD
Week 12	Exercises on development of working drawings of engines in Auto CAD
Week 13	Exercises on development of working drawings of engines in Auto CAD
Week 14	**Assessment**
Week 15	**-**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Interpreting Engineering Drawings, Jensen, C.H. and Helsel, G.D., 7th ed., Thomson Delmar Learning, 2007	Yes
Recommended Texts		
Websites		

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

11- Chemistry

Module Information معلومات المادة الدراسية		
Module Title	Chemistry	**Module Delivery**
Module Type	B	☒ **Theory**

Module Code	ENG 002			☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	UGI	**Semester of Delivery**	2	
Administering Department	MEC	**College**	ENG	
Module Leader	Dr. Abbas Hassan Faris	**e-mail**	abbashasan@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**		
Peer Reviewer Name	Dr. HamadKhalifa	**e-mail**	habdulkadir56@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	The goals of this course are to enable students to: 1. Scientific reasoning and quantitative analysis. Our majors will be able to apply chemical concepts to solve qualitative and quantitative problems. 2. Laboratory practice and safety. In order to learn the ways in which new scientific knowledge is created, our majors will experience how chemists interpret chemical and physical phenomena through experimental investigation. They will develop and apply the appropriate lab skills and instrumentation to solve chemical

	problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Define the structure of atoms in terms of the nucleus with protons, neutrons, & electrons. 2. Write and balance chemical equations, name inorganic compounds and ions and describe the properties of the main group elements. 3. Carry out chemical calculations, including mass relations in chemical reactions, limiting reagent & reaction yield calculations, and calculations of reactions taking place in solution. 4. Understand the concept of oxidation-reduction, calculate oxidation numbers, and balance redox reactions. 5. Apply the ideal gas law in solving problems involving the gas phase 6. Solve problems in chemical thermodynamics and calorimetry. 7. Predict the electronic structure of atoms and ions from quantum theory, and9) relate the position of an element in the periodic table to its electronic structure and to the physical and chemical properties of the elements. 8. Describe the principles of chemical bonding and write Lewis structures. 9. Predict the geometry of the electron pairs and the shape of molecules using VSEPR theory, predict bond polarity and molecular dipoles. 10. Describe the valence bond theory, predict the hybridization of atoms in molecules, and describe bonding in molecules with single, double and triple bonds in terms of and π bonds, and delocalized molecular orbitals.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: 1- Handling Numbers. Dimensional Analysis in Solving Problems Recognize chemical safety and hazardous materials icons 2- Atomic Number. Mass Number. and isotopes. The Periodic Table. Molecules and Ions. Describe laboratory instruments and some basic techniques used in the chemistry laboratory, including balances and standard volumetric equipment 3- Chemical Formulas. Naming Compounds. Atomic Mass. Vogadro's number and Molar Mass of an Element. 4- Chemical Reactions and Chemical Equations. 5- Describe how to Prepare accurate laboratory reports of their experimental results; Amounts of Reactants and Products; limiting Reagent Calculations; Reaction Yield; General Properties of Aqueous Solutions. Precipitation Reactions. Acid-Base

	Reactions; Oxidation-Reduction Reactions; Concentration of Solutions. 6- Acid-Base Titrations, Cases Pressure. 7- The ideal Gas Equation; Gas Stoichiometry; Partial Pressures; The Nature of Energy and types of energy 8- Energy Changes in Chemical Reactions; introduction to Thermodynamics. Enthalpy of Chemical Reactions; Calorimetry; 9- Standard Enthalpy of Formation and Reaction From Classical Physics to Quantum Theory; Bohr's Theory of the Hydrogen Atom; Quantum Numbers; Atomic OrbitalsElectron Configuration; 10- Development of the Periodic Table; Periodic Classification of the Elements; Periodic Variation in Physical Properties; Ionization Energy; Electron Affinity Lewis Dot Symbols; The ionic Bond; The Covalent Bond; Electro negativity; Writing Lewis structure Formal Charge and Lewis Structures. 11- The Concept of Resonance. Exceptions to the Octet Rule Bond Energy 12- Molecular Geometry; Dipole Moment; Spectrophotometric Analysis of tetracycline; Valence Bond Theory. Hybridization of Atomic Orbital's. Hybridization in Molecules Containing Double and Triple Bonds. Delocalized Molecular Orbital's <u>Part B:</u> 1- Types of analysis in analytical chemistry and their uses. Units for expressing concentration. 2- preparingsolutions,standardsolution,amounts of reactants and products. 3- Chemical equilibrium and reversible reactions,thermodynamics& chemical equilibrium 4- Equilibrium constants for chemical reactions. 5- Describe how to Prepare accurate laboratory reports of their experimental results 6- Equilibrium constants for chemical reactions 7- Electrochemistry, relationship between cell potential and the equilibrium constants relationship between ΔG, K,and E0cell . the Nernst equation. 8- Volumetric analysis their uses and classification, titrimetric analysis calculations. 9-Acid-base titration 10- Precipitation titration 11- Complexometric titration

	12- Oxidation-reduction titration 13- Gravimetric analysis. 14- Introduction and applications of industrial analysis method.

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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	2, 4, 6, 12, 14	LO # 1, 2, 4, 8, 9
	Online Assignments (HW)	**2**	**4% (4)**	5, 11	LO # 3, 7
	Onsite Assignments	**5**	**5% (5)**	3, 7, 10, 12, 13	LO # 2, 3, 5, 8, 10

	Report				
	Lab	**3**	**6% (6)**	2, 6, 11	LO # 1, 4, 9
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1 - 7
	Final Exam	**3 hr**	**50% (50)**	16	LO # 1 - 10
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Measurements in chemistry
Week 2	Problem Solving in Chemistry - Dimensional Analysis
Week 3	Atoms, Molecules and Ions
Week 4	Mass Relationships in Chemical Reactions
Week 5	Reactions in Aqueous Solutions
Week 6	Gasses and Thermochemistry
Week 7	Quantum Theory and the Electronic Structur of Atoms
Week 8	Chemical Bonding
Week 9	Electrochemistry
Week 10	Volumetric Methods of Analysis
Week 11	Titrations Based on Acid-Base Reactions
Week 12	Titrations Based on Precipitation Reactions
Week 13	Titrations Based on Complexation Reactions
Week 14	Titrations Based on Redox reactions
Week 15	Gravimetric Methods of Analysis

Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Determine the concentration of the sodium hydroxide (NaOH) solution by titrating it with a standard solution of hydrochloric acid (HCl)
Week 2	Lab 2: Determine the concentration of the acetic acid by titrating it with a standard solution of sodium hydroxide
Week 3	Lab 3: Determine the concentration of the hydrochloric acid by titrating it with a standard solution of sodium carbonate (Na2CO3)
Week 4	Lab 4: Determine the concentration of sodium carbonate (Na2CO3) and sodium bicarbonate (NaHCO3) in a mixture, titrating it with a standard hydrochloric acid solution.
Week 5	Lab 5: Measurement of turbidity in a water sample with discussion
Week 6	Lab 6: Density Measurements
Week 7	Lab 7: Viscosity Measurements

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introductory Chemistry Essentials, Nivaldo J. Tro	نعم
Recommended Texts	Chemistry. Steven S. Zumdahl, Susan A. Zumdahl, Donald J. DeCoste	

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	

		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		8/6/2023	

12- Engineering Mechanics-II (Dynamics)

Module Information معلومات المادة الدراسية		
Module Title	Engineering Mechanics-II(Dynamics)	**Module Delivery**
Module Type	C	☒ **Theory**

Module Code	MEC 002			☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGI		**Semester of Delivery**		2
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Ahmed N. Uwayed		**e-mail**	Ahmed.noori@uoanbar.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Dr. HamadM.Hasan		**e-mail**	hamad.m.hasan@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	ENG 006Engineering Mechanics-I (Static)	**Semester**	One
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To promote an understanding of the fundamentals and principles engineering mechanics: dynamics of particles, and rigid bodies in two and three dimensions including: kinematics and kinetics of particles and rigid bodies in 2D and 3D motion, rotations, translations, oscillations. 2. To develop the ability to apply Newtonian mechanics to model and predict the responses of simple dynamical system (particle and rigid body) subjected to applied forces.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To gain basic knowledge of kinematics and kinetics for planar mechanisms. 2. Understanding basics of the dynamics 3. Understand and be able to apply Newton's laws of motion 4. Understand and be able to apply other basic dynamics concepts - the Work

	Energy principle, 5. Understand and be able to apply other basic dynamics concept Impulse-Momentum principle and the coefficient of restitution. 6. Understand and be able to use Newton's laws of different types of motions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Rectilinear Kinematics: Continuous Motion** Understand the concepts of displacement, velocity and acceleration Demonstrate the motion of particle along curved path **Kinetics of a Particle: Force and Acceleration** Apply Newton's Second Low Demonstrate the analysis of accelerated motion **Kinetics of a Particle: Work and Energy** Develop the principle of work and energy and the possibility of apply them to solve problems include force, velocity and acceleration **Conservation of Energy** Conservative force, Understand types of energies Learn the concept of energy conservation **Principle of Linear Impulse and Momentum** Study the principle of linear impulse and momentum,Learning the concept of linear impulse and momentum conservation, Also this course demonstrate the concepts of Impact, angular momentum and rotation about a fixed axis.

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem)	52	**Unstructured SWL (h/w)**	3.47

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	3, 5, 7, 11, 13	LO # 1, 3, 4, 5, 6
	Online Assignments (HW)	3	6% (6)	2, 8, 12	LO # 2, 4, 5
	Onsite Assignments	3	5% (5)	4, 6, 14	LO # 1, 2, 4
	Report	1	4% (4)	14	LO # 6
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1 - 4
	Final Exam	3 hr	50% (50)	16	LO # 1 - 6
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Rectilinear Kinematics: Continuous Motion
Week 2	Rectilinear Kinematics: Continuous Motion
Week 3	Kinetics of a Particle: Force and Acceleration
Week 4	Kinetics of a Particle: Force and Acceleration
Week 5	Kinetics of a Particle: Force and Acceleration
Week 6	Kinetics of a Particle: Work and Energy
Week 7	Principle of Work and Energy
Week 8	Principle of Work and Energy for a System of Particles
Week 9	Power and Efficiency

Week 10	Conservation of Energy
Week 11	Principle of Linear Impulse and Momentum
Week 12	Impact
Week 13	Angular Momentum
Week 14	Angular Momentum
Week 15	Rotation about a Fixed Axis
Week 16	**Final Exams**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	R.C. Hibler, Engineering Mechanics: Dynamics, Prentice Hall, 12th ed., 2010. Mechanics of Machines: Advanced theory and examples. By: J. Hannah and R.C. Stephens.	Yes

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

13- Computer Programming

Module Information معلومات المادة الدراسية		
Module Title	Computer Programming	**Module Delivery**
Module Type	C	☒**Theory**

Module Code	MEC 003	☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**
ECTS Credits	2	
SWL (hr/sem)	50	

Module Level	UGI	**Semester of Delivery**	2
Administering Department	MEC	**College**	ENG
Module Leader	Dr. Mohammed GhanemJehad	**e-mail**	mgjehad@uoanbar.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr. Mohammed GhanemJehad	**e-mail**	mgjehad@uoanbar.edu.iq
Peer Reviewer Name	Dr. Saad M. Jalil	**e-mail**	saad.jalil@uoanbar.edu.iq
Scientific Committee Approval Date	1/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To solve problems through writing FORTRAN programs. 2. To be able to develop FORTRAN programs from specifications and document those program.

	3. To understand the useful of control structures, data types, input and output process. 4. To know how to verify that the programs are running correctly. 5. To write FORTRAN programs for engineering applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the fundamentals of programming. 2. Explore FORTRAN programming. 3. Classify data using constant and variables types in FORTRAN programming. 4. Manage input and output operations. 5. Perform mathematical and Logical functions. 6. Control program order: decision making in FORTRAN code. 7. Solve series function by repeating sequence of Instructions: Loops. 8. Conduct special mathematical operation on matrices. 9. Define the internal and external function in FORTRAN code. 10. Design subroutine program. 11. Solve differentiation numerically by FORTRAN code. 12. Solve integrals numerically by FORTRAN code.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Fundamentals of programming and exploring FORTRAN programming [10 hrs] Programming structures, variables/data types, read /write/print statements [10 hrs] Controlling the FORTRAN Program by using IF statements [15 hrs] Repeating Sequence of Instructions: DO Loops [10 hrs] Arrays and Matrices in FORTRAN[15 hrs] Internal functions, external functions and subroutines in FORTRAN [20 hrs] Programs for Engineering Applications (integrations and differentiation) [20 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The most important strategies that will be adopted in delivering this module are: - Allow students to actively participate in the learning process with class discussions and exercises that support the initiative. - Knowledge application and Extended critical thinking - Do Summative assessments Occurs at end of chapter - Do Formative Assessment occurs through chapter to Covers complete content areas - Case-Based Learning. - Experiential learning activities in lab.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	2	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	3,5,7, 11,13	LO # 1, 2, 4, 9, 10
	Online Assignments (HW)	**2**	**4% (4)**	4, 12	LO # 3, 11
	Onsite Assignments	**5**	**5% (5)**	2, 6, 8, 10, 14	LO # 5, 6,7, 8, 12
	Report				
	Lab	**3**	**6% (6)**	2, 6, 12	LO # 1, 3, 10
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1 - 7
	Final Exam	**3 hr**	**50% (50)**	16	LO # 1 - 12
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamentals of Programming
Week 2	Exploring FORTRAN Programming
Week 3	Classifying Data using Data types in FORTRAN Programming
Week 4	Managing Input and Output Operations
Week 5	Performing Mathematical and Logical functions: Operators and Expressions
Week 6	Controlling the Program Order: Decision Making
Week 7	Mid-term Exam
Week 8	Controlling the Program by using IF statements
Week 9	Repeating Sequence of Instructions: DO Loops
Week 10	Arrays and Matrices definition
Week 11	Mathematical operation on Matrices
Week 12	Internal and external functions in FORTRAN
Week 13	Subroutines in Fortran
Week 14	Numerical integration and area under the curve calculations
Week 15	Numerical differentiation coding
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Programming structures, variables/data types, read /write/print statements,
Week 2	IF statements program
Week 3	Do loops program
Week 4	File input and output and formatting
Week 5	Arrays and matrices program
Week 6	Subroutines and functions

Week 7	Programs for engineering applications

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	University of Duhram ITS, "An Introduction to Programming in FORTRAN90",2007	No
Recommended Texts	J.Adams, "Fortran 90 Handbook", Mc-Graw Hill Book Company 1992	No
Websites	https://www.uoanbar.edu.iq/EngineeringCollege/CMS.php?ID=15	

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval
المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	

Scientific Committee Member Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		8/6/2023	

14- English Language I

Module Information
معلومات المادة الدراسية

Module Title	English Language I			**Module Delivery**	
Module Type	S			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOA003				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		UGI	**Semester of Delivery**		Two
Administering Department		MEC	**College**	ENG	
Module Leader	Dr. AbdulrahmanM. Homadi		**e-mail**	Abd.mohammed@uoanbar.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Dr. ZinahJumaah Ahmed	**e-mail**	Zinah.j.ahmed@uoanbar.edu.iq	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Expand vocabulary and enhance communication in everyday situations. 2. Improve grammar skills for more accurate speaking and writing. 3. Develop better listening comprehension abilities. 4. Enhance spoken English fluency, accuracy, and pronunciation. 5. Improve reading comprehension and extract key information from texts. 6. Strengthen writing skills for well-structured and grammatically accurate compositions. 7. Increase cultural awareness of English-speaking societies and customs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Develop academic writing 2. Apply reading skills 3. Expand academic vocabulary through reading 4. Speak through group discussions and debates
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Tenses; Vocabulary (Jobs); Question forms; Writing (informal letter) • Present simple; Present continuous; Have/have to; Writing (Linking words +Describing a person) • Past simple; Past continuous; Have + noun; Writing (a story 1) • Count and noncount nouns; Expression of quantity; Articles; Vocabulary (clothes); Writing (filling in forms); • Verb patterns; Would like and like; Will and going to; Writing (postcard) • What … like? Comparative and superlatives; Vocabulary (adjective formation); Writing (relative closes) • Present perfect; Tense revision; Vocabulary (men and women); Writing (a biography) • have to & got to; have to & should & must; Vocabulary (job description); Writing (formal letter) • Present simple or will; Conditional clauses; Time clauses; Writing (discussing ideas) • Verb patterns; used to; Infinitives; Writing (formal letters) • The passive form; Active and passive; Vocabulary (words with more than one meaning); Writing (email) • Second conditional; might; Vocabulary (phrasal verbs); Writing (a story 2)

	●Present perfect continuous, word formation, Adverbs, writing letters ●Past perfect, Hot verbs, writing a story
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, speaking interactive activities and by considering type of activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2, 4, 7, 12, 13	LO # 1, 2, 3, 4
	Online Assignments (HW)	3	6% (6)	3, 5, 11	LO # 1, 3, 4
	Onsite Assignments	3	5% (5)	6, 8, 10	LO # 1, 2, 3
	Report	1	4% (4)	14	LO # 4
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1 - 3
	Final Exam	3 hr	50% (50)	16	LO # 1 - 4
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	●Tenses ● Questions ●Using a bilingual dictionary ● Social expressions-1
Week 2	●Present tenses ● Have/ have got ●Collection: daily life ● Making conversation
Week 3	●Past tenses ● Word formation ●Time expressions ● Personal information
Week 4	●Much/ many- ● some/ any ●a few, a little, a lot of ● Articles ●Shopping ● Prices
Week 5	●Verb patterns-1 ● Future forms ●Hot verbs ● How do you feel?
Week 6	●What ……. Like? ● Comparatives and superlatives ●Synonyms and antonyms ● Directions
Week 7	● Present perfect ● For, since ● Adverbs word pairs ● Short answers
Week 8	●Have (go) to ● Should/ must ●Words that go together ● At the doctor's
Week 9	**Mid Term Exam**
Week 10	●Time clauses ● If ●Hot verbs ● In the hotel
Week 11	●Verb patterns-2 ● Manage to, used to ●-ed/ -ing adjectives ● Exclamations
Week 12	●Passives ● Verbs and nouns that go together ●Notices
Week 13	●Second conditional ● Might ●Phrasal verbs ● Social expressions-2
Week 14	●Present perfect continuous ● Adverbs ●word formation ● writing letters
Week 15	●Past perfect ● writing a story ● Hot verbs
Week 16	**Preparatory for final exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	John & Liz Soars, "New Headway Plus- Pre-Intermediate Student's Book", 10th ed 2012	Yes
Recommended Texts	-Raymond Murphy; "English Grammar in Use", 4th edition 2012 Understanding and Using English Grammar, Vol. A, 4th Edition 4th Edition	No
Websites	https://sachtienganhhn.net/pdf-embed/life-pre-intermediate-b1-student-book.html https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_style_introduction.html	

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

Note: MarksDecimal 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 Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

1- Calculus-III

Module Information معلومات المادة الدراسية					
Module Title	**Calculus-III**			**Module Delivery**	
Module Type	**B**			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ENG 008**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	MEC		**College**	ENG	
Module Leader	Hamad M Hasan		**e-mail**	hamad.m.hasan@uoanbar.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	Ph.D.	

Module Tutor	Hamad M Hasan	**e-mail**	hamad.m.hasan@uoanbar.edu.iq
Peer Reviewer Name	Dr. Waleed M Abed	**e-mail**	waleed_eng76@uoanbar.edu.iq
Scientific Committee Approval Date	1/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	ENG 004 Calculus II	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Extend single variable calculus concepts to higher dimensions (e.g., partial derivatives, gradients, integrals, etc.). 2. Introduce vector notation and algebra. 3. Evaluate multiple integrals in appropriate coordinate systems such as rectangular, polar, cylindrical, and spherical coordinates. 4. Find and interpret partial derivatives, directional derivatives, and gradients. 5. Solve unconstrained and constrained optimization problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To understand how quadratic equations lead to complex numbers. To write complex numbers in polar form, compute exponential and integrals powers of complex numbers. To apply De-Moivre's theorem to determine roots of polynomial and can express hyperbolic, inverse hyperbolic functions. 2. Represent vectors analytically and geometrically, and compute dot and cross products for presentations of lines and planes. 3. Determine gradient vector fields and find potential functions. 4. To set up and evaluate multiple integrals for regions in the plane and to find Area of the region bounded by curves and to find volume. 5. Find partial derivatives, directional derivatives, and gradients and use them to solve applied problems.

	6. Find equations of tangent planes and normal lines to surfaces that are given implicitly or parametrically. 7. Use the chain rule for functions of several variables (including implicit differentiation).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Complex numbers, Point representation of complex numbers, Complex conjugate. (30hrs) Vectors and the Geometry of Space Three-Dimensional Coordinate Systems Vectors. (35 hrs) Partial Derivatives, Functions of Several Variables, limits, and continuity in higher dimensions. (35 hrs) Multiple Integrals, Double and Iterated Integrals over Rectangles, Double Integrals over General Regions, triple integrals in rectangular coordinates. (35 hrs) Revision problem classes (15hrs)

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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2,4,5, 10,12	LO #1, 3, 4,6 and 7
	Online Assignments (HW)	3	6% (6)	3,6, 11	LO # 2, 5 and 7
	Onsite Assignments	3	5% (5)	3,8,13	LO #3,6,7
	Report	1	4% (4)	14	LO #7
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1-5
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Complex numbers, Point representation of complex numbers, Complex conjugate
Week 2	Vectors and Properties of Vectors
Week 3	Geometry of Spaces
Week 4	Vector-Valued Functions
Week 5	Tangent and Normal Vectors and, Arch Length and Curvature
Week 6	Function of Several Variables
Week 7	Partial Derivatives and Chain Rules for Functions of Several Variables
Week 8	Tangent Planes and Normal Lines and, Extrema of Functions of Two Variables
Week 9	Iterated Integrals and Area in Plane
Week 10	Double Integrals and Volume
Week 11	Triple integrals and Applications
Week 12	Triple integrals In Cylindrical
Week 13	Vector Field and Line Integrals
Week 14	Conservative Vector Field, Independent of Path and, Green's Theorem

Week 15	Divergence and Stokes's Theorems
Week 16	**The final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus Early Transcendentals 12th Edition.by George B.	Yes
Recommended Texts	Calculus, by H. Anton, I. Bivens, and S. Davis, 8th Edition, 2002, Wiley	No
Websites	https://bcs.wiley.com/he bcs/Books?action=index&itemId=0471472441&itemTypeId=BKS&bcsId=2257	

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval
المصادقة على وصف المادة الدراسية

	Name	Date	Signature
Module Leader Approval		**8/6/2023**	

Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

2- Ethics and Leadership skills

Module Information معلومات المادة الدراسية					
Module Title	**Ethics and Leadership skills**			**Module Delivery**	
Module Type	**S**			☒ **Theory** **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENG 012**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		MEC	**College**	ENG	
Module Leader	Abdulsattar Ahmed A		**e-mail**	abdulsattar.ahmed@uoanbar.edu.iq	
Module Leader's Acad. Title		Asset.lecture	**Module Leader's Qualification**		Master
Module Tutor	Dr. Kadhum Ahmed Abed		**e-mail**	E-mailkadhum1968@uoanbar.edu.iq	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The goals of this course are to enable students to: 1-Develop an awareness of ethical challenges in your everyday lives and work. 2-Develop an awareness of ethical leadership/decision-making through research, interviews, observations in the real world, reading the text, and planning a symposium as a team.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Following completion of this course, students will be able to: 1- Explain the basic concepts of leadership. 2- Build power and influence. 3- Add value to their sphere of influence 4- Give and receive feedback, actively listen, provide supportive communication, and coach and counsel their team members
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **1.Introduction to leadership**: [4 hrs] Leadership definition, make a difference? Why is leadership **2-.Communication**[4 hrs] Communication types, Thoughts emotion and communication (head, heart and hands) What influences our communication, Damaging communication habits Connecting with others, Peer communication assessment

	3. Self-Administration[4 hrs] 4**Effective team leadership**[4 hrs] What is team Why work in teams? Different types of teams Team roles Role of team leader 5. **Administration Skills**[2 hrs] 6. **Leadership Skills**[2hrs] 7. **Leadership and management styles**[4 hrs] Management styles, Attributes of the engineering leader Modern leadership Characteristics of servant leader Command leadership vs. servant leadership 8. **Thinking and Smart Skills**[4 hrs] 9. **Education Development. Skills of Working Market and Commerce**[2 hrs] 10. **Marketing of Searches, Services and Ideas**[2 hrs] 11**. Making of Leaders and Leaders of Changing** [2 hrs] 12. **Leadership and management styles**[6 hrs] Management styles, Attributes of the engineering leader Modern leadership Characteristics of servant leader Command leadership vs. servant leadership 13. Introduction to Engineering Ethics[4 hrs] **14. Professional Ethics** Definition Origins Principles Professional Codes of Ethics[4 hrs] **15. Ethical Issues in Engineering Practice**[4 hrs] 1 -Safety Considerations 2- The Role of Good Design, Sustainable design and design for all , Safety and risk in Design. 3- Environmental Ethics

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	2,3,5, 10,11	LO #1, 2, 3 and 4
	Online Assignments (HW)	**3**	**6% (6)**	4,6,12	LO # 2, 3 and 4
	Onsite Assignments	**3**	**5% (5)**	6,8,13	LO #2,3,4
	Report	**1**	**4% (4)**	14	LO #4
	Lab				
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1-3
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to leadership.
Week 2	Communication
Week 3	Self-Administration
Week 4	**Effective team leadership**
Week 5	**Administration Skills**

Week 6	Leadership
Week 7	Skills Leadership and management styles
Week 8	Thinking and Smart Skills.
Week 9	Education Development
Week 10	Skills of Working Market and Commerce
Week 11	Marketing of Searches
Week 12	Making of Leaders and Leaders of Changing.
Week 13	**Leadership and management styles**
Week 14	. Professional Ethics
Week 15	15. Ethical Issues in Engineering Practice
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1- Benator, Barry and Thumann, Albert "Project Management and Leadership Skills for Engineering and Construction Projects." 2003, The Fairmont Press, Inc., USA	no
Recommended Texts	2- Fleddermann, C. B. (2012). Engineering Ethics. Upper Saddle River, NJ: Prentice Hall. 3- Csode of Ethics- Iraqi Engineers Association	No
Websites		

Grading Scheme

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

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

Module Approval

المصادقة على وصف المادة الدراسية

	Name	Date	Signature
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

3- Thermodynamics I

Module Information معلومات المادة الدراسية					
Module Title	**Thermodynamics I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC004**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	MEC		**College**	ENG	
Module Leader	Mohammed Ghanem Jehad		**e-mail**	mgjehad@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Mohammed Ghanem Jehad		**e-mail**	mgjehad@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	8. To deal with the thermodynamic systems and properties, relationships between the thermal and physical properties, the various cooling and heating processes in both expansion and compression conditions. 9. To understand the Zeroth and First Laws of Thermodynamics and applications of these laws in various open and close thermodynamic systems. 10. To apply the principles of Thermodynamics to various fluid and heat transfer problems with some alternative solutions. 11. To deal with the Second Law of Thermodynamics and applications of this law in various single and two-phase cycles. 12. How to describe the useful systems depending on their performance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Characterize, define and explain fundamental thermodynamic properties, heat, work, and system. 2. Derive, analyze and discuss the forms of energy, and perform the First Laws of Thermodynamics for closed and open systems. 3. Analyze and comprehend the single-phase system and the ideal gases under variousthermodynamics processes with its reversible and irreversible processes. 4. Perform and understand the two-phase problem (liquid-vapor) and analyze itsprocesses.
Indicative Contents المحتويات الإرشادية	• Indicative content includes the following. • Introduction and Basic Concepts, Systems and control volumes, Processes and cycles+ Temperature and zeroth law of thermodynamics [9hr]. • Forms of energy+ The first-law of thermodynamics, Energy conversion efficiency, [6hr]. • Properties of pure substances, Property diagrams for phase-change processes, Property tables [9hr]. • The ideal-gas equation of state, The second-law of thermodynamics, Thermal Energy Reservoirs+ Heat Engines, [9hr]. • Refrigerators and heat pumps, Reversible and irreversible processes [6hr].

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	The main strategy 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 in the lab.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2,4,6, 10,12	LO #1, and 2
	Online Assignments (HW)	2	4% (4)	5, 12	LO # 2 and 4
	Onsite Assignments	5	5% (5)	3,5,7,11,13	LO #2,3,4
	Report				
	Lab	3	6% (6)	3,6,9	LO #1,2,3
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1– 3
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and Basic Concepts
Week 2	Systems and control volumes
Week 3	Processes and cycles
Week 4	Temperature and zeroth law of thermodynamics
Week 5	Forms of energy+ The first-law of thermodynamics
Week 6	Energy conversion efficiency
Week 7	Properties of pure substances
Week 8	Property diagrams for phase-change processes
Week 9	Property tables
Week 10	The ideal-gas equation of state
Week 11	The second-law of thermodynamics
Week 12	Thermal Energy Reservoirs
Week 13	Heat Engines
Week 14	Refrigerators and heat pumps
Week 15	Reversible and irreversible processes
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Temperature measurement
Week 2	Lab 2: Temperature measurement
Week 3	Lab 3: Pressure volume relationship
Week 4	Lab 4: Pressure volume relationship
Week 5	Lab 5: Temperature-volume-pressure relationship
Week 6	Lab 6: Temperature-volume-pressure relationship
Week 7	Lab 7: Temperature-volume-pressure relationship

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	YUNUS A. CENGEL and MICHAEL A. BOLES" Thermodynamics an EngineeringApproach".	Yes
Recommended Texts	SONNTAG, BORGNAKKE and VAN WYLEN" Fundamental of Thermodynamics".	No
Websites		

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

Note: MarksDecimal 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 Approval المصادقة على وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

4- Fluid Mechanics I

Module Information معلومات المادة الدراسية					
Module Title	**Fluid Mechanics I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC005**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Waleed Mohammed Abed		**e-mail**	Waleed_eng76@uoanbar.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Waleed Mohammed Abed		**e-mail**	Waleed_eng76@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Explain and calculate the key fluid properties that relevant with the topics of fluid mechanics; 2. Evaluate hydrostatic forces on submerged planar and curved surfaces, and fluids in rigid-body motion; 3. Derive the main relations of conservation laws; 4. Derive and interpret the mass, Bernoulli, momentum analysis of flow systems and energy equation; 5. Calculate the transfer and extract of mechanical energy in systems containing pumps and turbines; 6. Apply the dimensional analysis on the fluid mechanics issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students who successfully complete the course should: 1. Know and comprehend the definitions of fundamental concepts of Fluid Mechanics. 2. Understand and apply the physical properties of Fluid including: continuum, density, specific weight, viscosity, surface tension and capillary effect. 3. Understand the basic equations of static fluid and derive the equation of pressure distribution for incompressible fluids. 4. Understand and demonstrate the application point of hydrostatic forces on submerged planar and curved surfaces, manometers and fluids in rigid-body motion. 5. Understand the main concepts of system and control volume and their applications (conservation laws), and describe the principles of motion for fluids. 6. Understand and identify how to derive basic equations and know the related assumptions and apply the equation of the conservation of mass, the equation of the conservation of momentum. 7. Understand the equation of the conservation of energy and Bernoulli equation, and identify transfer and extract of mechanical energy and solve their relevant problems that contain pumps and turbines. 8. Understand the concepts of dimensional analysis and apply The Buckingham Pi-Theorem, and derive the dimensionless numbers. 9. Know and apply the similarity concept and set up the relation between a model and a prototype.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Introductory Concepts of Fluid Mechanics:** This chapter covers the basic criteria of the concept of a fluid, the fluid as a continuum, dimensions and units, as well as fluid properties including density, specific weight, specific volume, specific gravity, viscosity, surface tension and capillarity. **Pressure Distribution in a Fluid statics:** This chapter deals with fluid pressure at a point, variation of pressure within a static fluid, hydrostatic law-Pressure head, Pascal's law, as well as measurement of pressure: piezometric tube, manometer. In addition, this chapter addresses Hydrostatic pressure

	distributions, hydrostatic forces on plane surfaces, hydrostatic forces on curved surfaces, pressure distribution in rigid-body motion. **Fluid Flow Concepts:** This chapter presents the main concepts of system and control volume and conservation laws (mass, Bernoulli, momentum), mass and volume flow rates, and the derivation of Bernoulli equation. **Dimensional Analysis and Modeling:** In this dimensional analysis chapter, dimensions, dimensional homogeneity, methods of dimensional analysis-Buckingham Pi theorem are presented. Moreover, model analysis (advantages and applications of model testing), similitude, derivations of important dimensionless numbers that relevant with fluid mechanics.

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2,5,7,11,13	LO # 1,4,5,8,9
	Online Assignments (HW)	2	4% (4)	3,10	LO # 3,6
	Onsite Assignments	5	5% (5)	2,6,8,12,14	LO #1,5,7,8,9
	Report				
	Lab	3	6% (6)	Continuous	LO #1,2,3,4
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1-6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introductory Concepts of Fluid Mechanics
Week 2	Thermodynamic Properties of Fluid
Week 3	Surface Tension and Capillary Effect
Week 4	Pressure Distribution in a Fluid
Week 5	Pressure Measurements
Week 6	Hydrostatic Forces on Submerged Plane Surfaces
Week 7	Hydrostatic forces on submerged curved surfaces
Week 8	Fluids in rigid-body motion and Rotation in a Cylindrical Container
Week 9	Fluid Flow Concepts (Definitions and Concepts)
Week 10	System and control volume of Fluid Flow
Week 11	The Bernoulli equation
Week 12	Applications of Bernoulli equation and mechanical energy and efficiency
Week 13	Dimensional analysis and similarity
Week 14	Buckingham theorem
Week 15	Physical Modeling (Geometric, Kinematic and Dynamic Similarities)
Week 16	**Final Exams**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Calibration of Bourdon Gauge
Week 2	Lab 1: Calibration of Bourdon Gauge
Week 3	Lab 1: Calibration of Bourdon Gauge
Week 4	Lab 2: Center of Pressure
Week 5	Lab 2: Center of Pressure
Week 6	Lab 2: Center of Pressure
Week 7	Lab 3: Stability of a Floating Body
Week 8	Lab 3: Stability of a Floating Body
Week 9	Lab 3: Stability of a Floating Body
Week 10	Lab 4: Flow through Venturi Meter
Week 11	Lab 4: Flow through Venturi Meter
Week 12	Lab 4: Flow through Venturi Meter

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Frank M. White, “Fluid Mechanics”, WCB McGraw-Hill series in mechanical engineering, Fourth Edition, 2012. 2. Yunus A. Çengel and John M. Cimbala, “Fluid Mechanics: Fundamentals and Applications”, McGraw-Hill series in mechanical engineering, First Edition, 2006.	Yes
Recommended Texts	1. Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, and Wade W. Huebsch, “Fundamentals of Fluid Mechanics”, John Wiley & Sons, 6th Edition, 2009. 2. Victor L. Streeter, E. Benjamin Wylie, Keith W. Bedford, “Fluid Mechanics”, McGraw-Hill, 9th Edition, 2002.	Yes

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

Note: MarksDecimal 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 Approval المصادقة على وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

5- Strength of Materials I

Module Information
معلومات المادة الدراسية

Module Title	**Strength of Materials I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC006**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Mazin Yaseen Abbood		**e-mail**	mazin76eng@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Mazin Yaseen Abbood		**e-mail**	mazin76eng@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	ENG 006Engineering Mechanics I (Static)	**Semester**	1
Co-requisites module	None	**Semester**	

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

Module Aims أهداف المادة الدراسية	1. Calculate stresses on a member subjected to axial loads 2. Calculate stresses of a member subjected to shear force 3. Explain and compute the mechanical properties of materials. 4. Calculate angular rotation of a shaft subjected to torsional moment. 5. Compute forces, stresses, and bending moments in loaded beams. 6. Evaluate combined stresses and draw Mohr's stress circle.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the effect of direct (tension or compression) force on mechanical parts. 2. Analyze the stress-strain curve of any materials and compute some mechanical properties from this curve. 3. Understand the effect shear force on mechanical parts and the difference between direct and shear forces. 4. Evaluate the thermal stresses of mechanical structures. 5. Drawing the shear force and bending moment diagram of beams subjected to these types of loads. 6. Determine the stresses within beams which subjected to shear force and bending moment loads. 7. Evaluate the shear stress result from bending on beams. 8. Analyze the effect of torsion stress on circular parts. 9. Recognize the difference between direct shear and torsion. 10. Draw Mohr's stress circle and compute combine stresses in different type of loading. 11. Evaluate the maximum stresses due to combined stresses.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Strengths of Materials/Statics Review: this chapter includes a quick review of principles of equilibrium equations that helps determining the reaction forces, also contains different types of forces such as normal and shear force. 2. Simple stresses and strains: this chapter contains simple stress in tension and compression, extension of bars which are subjected to direct and shear stresses. 3. Compound beams: this chapter deals with any engineering structure includes bars or tubes with different materials types. Also, thermal stresses and strains are included in this chapter. 4. Bending moments and shearing forces diagrams: different types of loading on different types of beam will be discussed in this topic. This helps to draw the shear forces and bending moment diagrams of these types of beams which consider the basic knowledge to know the type of stress within these beams. 5. Bending stresses in beams: this topic deals with bending stress of different types of beam that are subjected to bending load results from different types of loads such as concentrated loads and uniformly distributed loads. 6. Torsion: this topic will discuss any engineering structure that is subjected to torque and lead to shear stress. 7. Shear stresses in beams: this chapter will make the students recognize the difference between shear stress due to direct shear force and shear stress due to bending. 8. Combined stresses: this chapter will conduct the principal stresses and maximum shear stresses due to combined stresses such as torsion with bending or hoop stress with torsion and so on.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to: 3. Encourage students' participation in the exercises 4. 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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	3,5,7,11,13	LO # 2,4,6,9,11
	Online Assignments (HW)	**2**	**4% (4)**	6,12	LO # 4, 5, 6,10.
	Onsite Assignments	**5**	**5% (5)**	2,4,6,10,12	LO # 1,3,5,9,11
	Report				
	Lab	**3**	**6% (6)**	Continuous	LO #1,2,3,7,8
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1-6
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Strengths of Materials/Statics Review
Week 2	Introduction to Strengths of Materials/Statics Review
Week 3	Introduction to Strengths of Materials/Statics Review
Week 4	Simple stresses and strains
Week 5	Simple stresses and strains
Week 6	Bending moments and shearing forces
Week 7	Bending moments and shearing forces
Week 8	Bending moments and shearing forces
Week 9	Bending stresses in beams
Week 10	Bending stresses in beams
Week 11	Bending stresses in beams
Week 12	Shear stress in beams
Week 13	Shear stress in beams
Week 14	Torsion
Week 15	Torsion
Week 16	**Final Exams**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: reactions of simply supported beam
Week 2	Lab 1: reactions of simply supported beam
Week 3	Lab 1: reactions of simply supported beam
Week 4	Lab 2: Tension test
Week 5	Lab 2: Tension test
Week 6	Lab 2: Tension test
Week 7	Lab 3: Bending test
Week 8	Lab 3: Bending test

Week 9	Lab 3: Bending test
Week 10	Lab 4: Torsion test
Week 11	Lab 4: Torsion test
Week 12	Lab 4: Torsion test

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	E.J. Hearn, strength of materials. Third edition.1997	Yes
Recommended Texts	R.C. Hibbeler, Mechanics of Materials, Prentice Hall, 7th ed., 2007	No
Websites		

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval
المصادقة على وصف المادة الدراسية

	Name	**Date**	**Signature**

Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

6- Mechanical Drawing

Module Information معلومات المادة الدراسية					
Module Title	**Mechanical Drawing**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MEC007**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	MEC		**College**	ENG	
Module Leader	Rashaq Abdullah Mohammed		**e-mail**	rashaqabdullah@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	MSc.	
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name	Dr. Khaldoon Fadhel		**e-mail**	Khaldon77m@uoanbar.edu.iq	
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG 007 Engineering Drawing	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Represent the various geometric shapes in drawing. 2. Represent of the connection of bolts and screws to the drawing and interpretation. 3. Engage the engineering parts by symbols welding on the drawing and interpreting these symbols 4. Determine the mechanisms of movement between the geometric parts and placing the appropriate symbols on them. 5. Draw the assembled mechanical parts and determine the mechanism or method of assembly
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Ability to describe mechanical parts by drawing 2. Ability to determine the method of linking the mechanical parts and the status of the appropriate symbols and how to calculate the details of these symbols mathematically. 3. The ability to identify the moving mechanical parts in the machines and put the appropriate symbols for them and solve them mathematically 4. The ability to represent mechanical parts individually, collectively and assembled
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to mechanical drawing [2 hrs] Representation of solid design [10 hrs] Sectional views Revision problem classes [4 hrs] Mechanical fastening components Nuts, bolts, screws Keys and keyways Revision problem classes [4 hrs] Welding and welding symbols Tolerancing dimensions and fits Revision problem classes [4 hrs] Gears Revision problem classes [4 hrs] Assembly drawing Revision problem classes [4 hrs]

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. Also, encourage students to learn how to identify the fastening of different mechanical parts by using various methods. 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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	**1**	**3% (3)**	5	LO #2
	Online Assignments (HW)	**7**	**7% (7)**	3,4,5,7,10,11, 13	LO # 1, 2, 3 and 4
	Onsite Assignments	**10**	**20% (20)**	2-12	LO # 1, 2, 3 and 4
	Report	**3**	**3% (3)**	11,12,13	LO #3,4
	Lab	**7**	**7% (7)**	2,4,6,8,12,13, 14	LO # 1, 2, 3 and 4
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1, 2, 3
	Final Exam	**3 hr**	**50% (50)**	16	LO # 1, 2, 3 and 4
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to mechanical drawing
Week 2	Representation of solid design- Sectional views
Week 3	Representation of solid design- Sectional views
Week 4	Nuts, bolts, screws
Week 5	Nuts, bolts, screws
Week 6	Keys and keyways
Week 7	Welding and welding symbols
Week 8	Welding and welding symbols
Week 9	Welding and welding symbols
Week 10	Tolerancing dimensions and fits
Week 11	Tolerancing dimensions and fits
Week 12	Gears
Week 13	assembly drawing
Week 14	assembly drawing
Week 15	assembly drawing
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Learning of principle of solidworks drawing
Week 2	Learning of principle of solidworks drawing
Week 3	Learning of principle of solidworks drawing
Week 4	Learning of principle of solidworks drawing
Week 5	Learning of 2D drawing by solidworks
Week 6	Learning of 2D drawing by solidworks
Week 7	Learning of 2D drawing by solidworks
Week 8	Learning of 2D drawing by solidworks
Week 9	Learning of 3D drawing by solidworks.

Week 10	Learning of 3D drawing by solidworks.
Week 11	Learning of 3D drawing by solidworks.
Week 12	Learningassembly drawing by solidworks
Week 13	Learningassembly drawing by solidworks
Week 14	Learningassembly drawing by solidworks
Week 15	Learningassembly drawing by solidworks

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	الرسم الهندسي عبدالرسول الخفاف.	Yes
Recommended Texts	1. Colin H Simmons, Manual of Engineering Drawing Second edition. 2. Dr. K.L. Narayana, Dr. P. Kannaiah and K. Venkata Reddy, Machine drawing Third	Yes

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval
المصادقة على وصف المادة الدراسية

	Name	Date	Signature
Module Leader Approval		8/6/2023	
Peer Reviewer Approval		8/6/2023	
Scientific Committee Member Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		8/6/2023	

7- Arabic Language II

Module Information معلومات المادة الدراسية					
Module Title	**Arabic Language II**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOA 002				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	MEC		**College**	ENG	
Module Leader	Muanna w naji		**e-mail**	muanna.naji@uoanbar.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	11/11/2023		**Version Number**		

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This course aims to build students' knowledge and competence in the Arabic language, rhetoric, and Arabic literature of all kinds, to increase their ability to appreciate literature and develop their awareness of its concepts : 1. Work on developing the intellectual property of the student. 2. Ensuring the personal development of the student at the academic level.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Develop academic essay writing proficiency 2. Apply reading skills 3. Expand academic vocabulary through reading 4. Improve critical thinking skills 5. Developing the student's intellectual property in the field of the Arabic language, to acquire verbal and actual ability and skill.
Indicative Contents المحتويات الإرشادية	Arabic grammar, its importance and place in the language. [5 hours] Arabic grammar: subject and object, hamza k, linguistic differences [10 hours] Common mistakes in the Arabic language [5 hours] Arabic Grammar Verbs The Five Types of Noun in the Arabic Language [10 Hours] Advancement and delay in the Holy Qur'an Graphic touches in the Holy Qur'an [5 hours] Literature and Rhetoric [10 hours] Poetry and poets [15 hours]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Raise the students' linguistic level, and build their intellectual progress by highlighting the importance of the Arabic language in their lives as their mother tongue.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

	Time/Number	Weight (Marks)	Week Due	Relevant Learning

					Outcome
Formative assessment	Quizzes	5	25% (25)	3,6,8,10,12	LO #1,2,3,4 and 5
	Online Assignments (HW)	3	6% (6)	4,7,11	LO #2,3,4
	Onsite Assignments	3	5% (5)	5,7,13	LO #2,3,5
	Report	1	4% (4)	14	LO # 2,3,4
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1,2,3
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Arabic grammar, its importance and place in the language.
Week 2	Arabic grammarThe subject and the object
Week 3	Arabic grammarDrawing a hamza
Week 4	The miraculous linguistic meanings in some Quranic surahs
Week 5	Linguistic differences
Week 6	Common mistakes in the Arabic language
Week 7	Mid-term Exam
Week 8	Arabic grammarThe five actions
Week 9	Types of no in the Arabic language
Week 10	Progress and delay in the Holy Quran
Week 11	Graphic touches in the Holy Quran
Week 12	Graphic touches in the Holy Quran
Week 13	Literature, poetry and poets
Week 14	Poetry and poets, Imru' Al-Qais / Abu Al-Atahiya
Week 15	**Poetry and poets, Badr ShakeralSayyab. Aljeweler**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Lectures in the Arabic language.	Yes
Recommended Texts	Meanings of grammar / Prof. Dr. Fadel Al-Samarrai	No
Websites	Applied grammar in the Arabic language	

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

Note: MarksDecimal 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 Approval المصادقة على وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

8- The Crimes of Baath Regime in Iraq

Module Information معلومات المادة الدراسية					
Module Title	**The crimes of Baath regime in Iraq**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOA006**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		MEC	**College**	ENG	
Module Leader	Ahmed Kareem Madab		**e-mail**	ahmed.almadab@uoanbar.edu.iq	
Module Leader's Acad. Title		Instructor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

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

Module Aims أهداف المادة الدراسية	This course aims to build students' knowledge about: 1- The crimes of Baath regime according to the law of the Supreme Iraqi Criminal Court of 2005. 2- Psychological and social effects of these crimes. 3- Environmental crimes of Baath Party. 4- Mass graves crimes Baath Party.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Develop knowledge about Baath regime Crimes 2. Develop the student's understanding of the effects of these crimes
Indicative Contents المحتويات الإرشادية	-A general introduction to the curriculum - Crimes of the Baath regime according to the Law of the Supreme Iraqi Criminal Court in 2005 AD, sections of crimes. - The concept of crimes and their types. - Definition of crime linguistically and terminologically. - The crimes of the Baath regime according to the documentation of the Law of the Supreme Iraqi Criminal Court in 2005 - Types of international crimes - Decisions issued by the Supreme Criminal Court. - Psychological and social crimes and their effects, and the most prominent violations of the Baathist regime in Iraq. - Psychological crimes. - Mechanisms of psychological crimes. - Psychological effects of crimes. - Social crimes - Militarization of society. - The Baathist regime's position on religion - Violations of Iraqi laws. - Pictures of human rights violations and crimes of power - Pictures of human rights violations and crimes of authority -2 - Some decisions regarding political and military violations of the Baath regime. - Prison and detention places of the Baath regime. - Environmental crimes of the Baath regime in Iraq. - Military and radioactive contamination and mine explosions - Destruction of cities and villages (scorched earth policy) - Drying the marshes - Demolishing palm groves, trees and crops - Mass grave crimes - Incidents of genocide graves committed by the Baathist regime in Iraq - Chronological classification of genocide graves in Iraq for the period 1963 AD - 2003 AD. - Chronological classification of genocide graves in Iraq for the period 1963 AD - 2003 AD.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Raise the students' linguistic level, and build their intellectual progress by highlighting the importance of the knowledge of the crimes of Baath Party in their lives

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	3,6,8,10,12	LO #1,2
	Online Assignments (HW)	**3**	**6% (6)**	4,7,11	LO #1,2
	Onsite Assignments	**3**	**5% (5)**	5,7,13	LO #1,2
	Report	**1**	**4% (4)**	14	LO # 2
	Lab				
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	-A general introduction to the curriculum - Crimes of the Baath regime according to the Law of the Supreme Iraqi Criminal Court in 2005 AD, sections of crimes. - The concept of crimes and their types. - Definition of crime linguistically and terminologically.
Week 2	- The crimes of the Baath regime according to the documentation of the Law of the Supreme Iraqi Criminal Court in 2005 - Types of international crimes - Decisions issued by the Supreme Criminal Court.
Week 3	- Psychological and social crimes and their effects, and the most prominent violations of the Baathist regime in Iraq. - Psychological crimes. - Mechanisms of psychological crimes. - Psychological effects of crimes.
Week 4	- Social crimes - Militarization of society. - The Baathist regime's position on religion
Week 5	- Violations of Iraqi laws.
Week 6	- Pictures of human rights violations and crimes of power
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit
Week 8	- Pictures of human rights violations and crimes of authority -2 - Some decisions regarding political and military violations of the Baath regime. - Prison and detention places of the Baath regime.
Week 9	- Environmental crimes of the Baath regime in Iraq. - Military and radioactive contamination and mine explosions
Week 10	- Destruction of cities and villages (scorched earth policy)
Week 11	- Drying the marshes - Demolishing palm groves, trees and crops
Week 12	- Mass grave crimes - Incidents of genocide graves committed by the Baathist regime in Iraq
Week 13	- Chronological classification of genocide graves in Iraq for the period 1963 AD - 2003 AD.

Week 14	- Chronological classification of genocide graves in Iraq for the period 1963 AD - 2003 AD.
Week 15	Exam 2
Week 16	**Preparatory week before the final Exam**

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

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

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

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

Note: MarksDecimal 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 Approval

المصادقة على وصف المادة الدراسية

	Name	Date	Signature
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

9- Calculus-IV

Module Information معلومات المادة الدراسية					
Module Title	**Calculus-IV**			**Module Delivery**	
Module Type	**B**			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ENG 009**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	Four	
Administering Department	MEC		**College**	ENG	
Module Leader	Hamad M Hasan		**e-mail**	hamad.m.hasan@uoanbar.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Hamad M Hasan		**e-mail**	hamad.m.hasan@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Waleed Mohammed Abed		**e-mail**	waleed_eng76@uoanbar.edu.iq	
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG 008 Calculus III	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Study the formation of Differential equation from the given physical problems and to solve first order ordinary differential equation by various methods. 2. Study the Laplace, transformation, and its properties. 3. Study the Fourier series representation of a function of one variable and to find half-range Fourier series for even/odd functions. 4. Apply Green's Theorem, Stokes' Theorem, and the Divergence Theorem). 5. Study the convergence and divergence of infinite series and evaluate successive differentiation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To understand the formation of Differential equation from the given physical problems and to solve first order ordinary differential equation by various methods. 2. To be able to apply the knowledge of first order ordinary differential equation in different engineering applications. 3. To find the Fourier series representation of a function of one variable and to find half-range Fourier series for even/odd functions. 4. To understand the Laplace, transform and its properties. 5. Apply the Laplace transform to solve differential equations. 6. To understand the convergence and divergence of infinite series and to evaluate successive differentiation. 7. be able to understand and use Green's Theorem, Stokes' Theorem, and the Divergence Theorem.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Solutions of Homogeneous and Inhomogeneous Linear D.E with constant coefficients (25 hrs) Elimination of dependent variables by differentiation and by using operator equation (25 hrs) Concept of Periodic functions, Trigonometric series, Bounds of a Function, Continuity of a Function, Euler Coefficients (25 hrs) Properties and Inverse of Laplace Transforms, Solution of Ordinary and Simultaneous Linear D. E's by Laplace transforms (25 hrs) Green's Theorem in the Plane, Stokes' Theorem, The Divergence Theorem, and a Unified Theory (25 hrs) Revision problem classes (6 hrs)

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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	2,4,5, 10,12	LO #1, 3, 4,6 and 7
	Online Assignments (HW)	**3**	**6% (6)**	3,6, 11	LO # 2, 5 and 7
	Onsite Assignments	**3**	**5% (5)**	3,8,13	LO #3,6,7
	Report	**1**	**4% (4)**	14	LO #7
	Lab				
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1-5
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	First-Order Differential Equations: Initial-value problem. Separable variables.
Week 2	Homogeneous equations. Exact equations. Linear equations.
Week 3	Second-Order Differential Equations: Initial-value and Boundary-value problems.
Week 4	Linear differential operators. Reduction of order. Homogeneous equations with constant coefficients.
Week 5	Non-homogeneous equations. Method of undetermined coefficients. Method of variation of parameters.
Week 6	Some nonlinear equations. Applications. Higher order Differential Equations.
Week 7	Higher order Differential Equations
Week 8	Simultaneous Linear Differential Equations
Week 9	Fourier series solutions.
Week 10	Euler Coefficients, Even and Odd Functions, Half Range Expansion, Applications problems.
Week 11	Laplace Transforms
Week 12	Application of Linear Algebra. Homogeneous linear systems. Non-homogeneous linear systems. Solving systems by Laplace transforms.
Week 13	Series Solutions: Cauchy- Euler equation method. Solutions about ordinary points. Solutions about singular points.
Week 14	Method of Frobenius. Second Solutions and Logarithm terms.
Week 15	First-Order Differential Equations: Initial-value problem. Separable variables.
Week 16	**The Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' Calculus Early Transcendentals 12th Edition.by George B.	Yes
Recommended Texts	Calculus, by H. Anton, I. Bivens, and S. Davis, 8th Edition, 2002, Wiley	No
Websites	https://bcs.wiley.com/he bcs/Books?action=index&itemId=0471472441&itemTypeId=BKS&bcsId=2257	

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

Note: MarksDecimal 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 Approval المصادقة على وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

10- Thermodynamics II

Module Information
معلومات المادة الدراسية

Module Title	**Thermodynamics II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC008**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	MEC		**College**	ENG	
Module Leader	Mohammed Ghanem Jehad		**e-mail**	mgjehad@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Mohammed Ghanem Jehad		**e-mail**	mgjehad@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MEC004 Thermodynamics I	**Semester**	3
Co-requisites module	None	**Semester**	

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

Module Aims	1. To deal with the thermodynamic systems and properties, relationships

أهداف المادة الدراسية	between the thermal and physical properties, the various cooling and heating processes in both expansion and compression conditions. 2. To understand the Zeroth and First Laws of Thermodynamics and applications of these laws in various open and close thermodynamic systems. 3. To apply the principles of Thermodynamics to various fluid and heat transfer problems with some alternative solutions. 4. To deal with the Second Law of Thermodynamics and applications of this law in various single and two-phase cycles. 5. How to describe the useful systems depending on their performance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Analyze both closed and open gas power cycles, and perform second-law analysis of gas power cycles. 2. Analyze vapor power cycles, perform second-law analysis of vapor power cycles, and how to modify the basic vapor power cycle to increase the cycle thermal efficiency. 3. Define a new property (i.e., entropy) to quantify the second law effects, and derive the reversible steady-flow work relations. 4. Analyze the ideal and actual vapor compression refrigeration cycle, and analyze the gas refrigeration systems.
Indicative Contents المحتويات الإرشادية	• Indicative content includes the following. • Cycles, The Carnot Cycle [6hr]., Gas power cycles (Ch.1), Carnot cycle, Otto cycle, Diesel cycle, Brayton cycle [15 hr]. • Vapor and combined power cycles, Carnot vapor cycle, Rankine cycle, Combined gas-vapor power cycle [9hr]. • Entropy, Entropy of evaporation, Superheated steam entropy, Processes [12 hr]. • Refrigeration systems, Carnot cycle, Refrigeration cycles [9hr].

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy 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 in the lab.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2,4,6, 10,12	LO #1, and 2
	Online Assignments (HW)	2	4% (4)	5, 12	LO # 2 and 4
	Onsite Assignments	5	5% (5)	3,5,7,11,13	LO #2,3,4
	Report				
	Lab	3	6% (6)	3,6,9	LO #1,2,3
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1– 3
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Gas power cycles, Carnot cycle
Week 2	Otto cycle
Week 3	Diesel cycle
Week 4	Brayton cycle
Week 5	Vapor and combined power cycles
Week 6	Carnot vapor cycle
Week 7	Rankine cycle
Week 8	Combined gas-vapor power cycle
Week 9	Entropy
Week 10	Entropy of evaporation
Week 11	Superheated steam entropy
Week 12	Entropy change of ideal gas
Week 13	Refrigeration systems
Week 14	Carnot cycle
Week 15	Refrigeration cycles
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Mechanical Heat Pump
Week 2	Lab 2: Mechanical Heat Pump
Week 3	Lab 3: Steam and Boiling
Week 4	Lab 4: Steam and Boiling
Week 5	Lab 5: Measurement of dryness fraction of steam
Week 6	Lab 6: steam power plant
Week 7	Lab 7: steam power plant

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the

		Library?
Required Texts	YUNUS A. CENGEL and MICHAEL A. BOLES" Thermodynamics an EngineeringApproach".	Yes
Recommended Texts	SONNTAG, BORGNAKKE and VAN WYLEN" Fundamental of Thermodynamics".	No
Websites		

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval
المصادقة على وصف المادة الدراسية

	Name	Date	Signature
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

11- Fluid Mechanics II

Module Information معلومات المادة الدراسية					
Module Title	**Fluid Mechanics II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC009**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Waleed Mohammed Abed		**e-mail**	Waleed_eng76@uoanbar.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Waleed Mohammed Abed		**e-mail**	Waleed_eng76@uoanbar.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEC 005 Fluid Mechanics I	**Semester**	3
Co-requisites module	None	**Semester**	

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

Module Aims أهداف المادة الدراسية	1. Explain the main concepts of viscous internal laminar and turbulent flows (through pipes and ducts); 2. Evaluate the pressure drop and pumping power for the viscous laminar and turbulent flow through pipes and ducts; 3. quantify the major (friction) and minor (fittings and components) losses of flow in piping system; 4. compute the useful pump head delivered to the fluid and the turbine head extracted from the fluid for the piping networks connected to each other in series and/or in parallel; 5. Describe the measurement instruments of flow rate and velocity and do the calculations. 6. Select pump characteristics and system characteristics to determine the operation point.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students who successfully complete the course should: 1. Understand the main concepts of viscous internal laminar and turbulent flows; 2. Know the pressure drop and pumping power for the viscous laminar flow through pipes and ducts; 3. Comprehend the pressure drop and pumping power for the viscous turbulent flow through pipes and ducts; 4. Understand the major friction losses of flow in pipes and ducts; 5. Understand the minor (fittings and components) losses of flow in piping system (pipes and ducts); 6. Understand the useful pump head delivered to the fluid and the turbine head extracted from the fluid for the piping networks. 7. Know the principles of piping networks connections to each other in series and in parallel; 8. Understand the measurement instruments of flow rate and velocity; 9. Know pump characteristics and system characteristics and the operation point.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Laminar Flow in pipes:** This chapter covers the main concepts of viscous internal laminar flow; definition of Reynolds Number, the analysis of laminar flow in pipes, pressure drop and head loss, pumping power. **Turbulent flow in pipes:** This chapter addresses the main concepts of viscous internal turbulent flow; the Colebrook equation and the Moody Chart of friction factor, and types of Fluid Flow Problems. **Minor Losses in Pipe Systems:** This chapter deals with the minor losses due to fittings, valves, bends, elbows, tees, inlets, exits, enlargements, and contractions in addition to the pipes, the expression of minor losses in terms of "loss coefficient", flow contraction and the associated head losses at a

	sharp-edged pipe inlet, sudden or gradual expansion or contraction sections. **Piping networks and pump selection:** This chapter presents pipes connection in series, pipes connection in parallel, piping systems with pumps and turbines, the efficiency of the pump–motor combination. **Turbomachinery-Pumps:** This chapter displays introduction of turbomachinery, classification of pumps, pump performance curves and matching a pump to a piping system.

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

					Outcome
Formative assessment	**Quizzes**	**5**	**25% (25)**	2,5,7,11,13	LO # 1,4,5,8,9
	Online Assignments (HW)	**2**	**4% (4)**	3,10	LO # 3,6
	Onsite Assignments	**5**	**5% (5)**	2,6,8,12,14	LO #1,5,7,8,9
	Report				
	Lab	**3**	**6% (6)**	Continuous	LO #1,2,3,4
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1-6
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Laminar flow in pipes
Week 2	Analysis of Laminar flow in pipes
Week 3	Pressure drop and head loss of laminar flow
Week 4	Turbulent flow in pipes
Week 5	Analysis of Turbulent flow in pipes
Week 6	The Colebrook equation and the Moody Chart of friction factor
Week 7	Types of fluid flow problems
Week 8	Piping Networks with Pumps and Turbines
Week 9	The efficiency of the pump–motor combination
Week 10	Flow rate and velocity measurements
Week 11	Pitot-static tubes and its applications
Week 12	Obstruction flowmeters: Orifice, Venturi, and Nozzle meters
Week 13	The concepts of turbomachinery-Pumps
Week 14	Classification of pumps
Week 15	Pump Performance Curves and Matching a Pump to a Piping System
Week 16	**Final Exams**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Flow Types in Pipes
Week 2	Lab 1: Flow Types in Pipes
Week 3	Lab 1: Flow Types in Pipes
Week 4	Lab 2: Frictional Losses in Pipes
Week 5	Lab 2: Frictional Losses in Pipes
Week 6	Lab 2: Frictional Losses in Pipes
Week 7	Lab 3: Minor Losses in piping system
Week 8	Lab 3: Minor Losses in piping system
Week 9	Lab 3: Minor Losses in piping system
Week 10	Lab 4: The test of pumps
Week 11	Lab 4: The test of pumps
Week 12	Lab 4: The test of pumps

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Frank M. White, “Fluid Mechanics”, WCB McGraw-Hill series in mechanical engineering, Fourth Edition, 2012. 2. Yunus A. Çengel and John M. Cimbala, “Fluid Mechanics: Fundamentals and Applications”, McGraw-Hill series in mechanical engineering, First Edition, 2006.	Yes
Recommended Texts	1. Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, and Wade W. Huebsch, “Fundamentals of Fluid Mechanics”, John Wiley & Sons, 6th Edition, 2009. 2. Victor L. Streeter, E. Benjamin Wylie, Keith W. Bedford, “Fluid Mechanics”, McGraw-Hill, 9th Edition,	Yes

	2002.	

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

Note: MarksDecimal 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 Approval المصادقة على وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

12- Strength of Materials II

Module Information
معلومات المادة الدراسية

Module Title	**Strength of Materials II**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MEC010**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		MEC	**College**	ENG	
Module Leader	Dr. Mazin Yaseen Abbood		**e-mail**	mazin76eng@uoanbar.edu.iq	
Module Leader's Acad. Title		Assit. Prof.	**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr. Mazin Yaseen Abbood		**e-mail**	mazin76eng@uoanbar.edu.iq	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date		1/06/2023	**Version Number**		1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MEC 006-Strength of Materials I	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Calculate the deflection of determinate beams. 2. Calculate the deflection of indeterminate beams. 3. Calculate stresses in thin cylinders. 4. Calculate stresses in thick cylinders 5. Euler buckling, short and long columns. 6. Strain energy. 7. Explain the difference between brittle and ductile material in term of failure mode and Compute the factor of safety of different loading types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Evaluate the deflection of determinate and indeterminate beams under different loads. 2. Draw shear force and bending moment diagrams for indeterminate beam using Macaulay's method. 3. Conduct the deflection of indeterminate beams under different loads. 4. Determine the stresses and strains in thin cylinders subjected internal pressure. 5. Determine the stresses and strains in thick cylinders subjected internal pressure. 6. Recognize the difference between thin and thick cylinders under same loading. 7. Design simple bars, beams, and circular shafts for allowable stresses and loads by determine the factor of safety. 8. Analyze slender, long columns subjected to axial loads. 9. Analyze the deflection of different type of loading (Tension, compression, bending, impact) using Castigliano's theorem. 10. Recognize the difference in failure between ductile and brittle materials.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Deflection of determinate beams: the deflection of determinate beams under different loads such as concentrated, uniformly distributed load and increasing loads will be discussed in this chapter. 2. Deflection of indeterminate beams: this chapter determine the shear force and bending moment diagram for indeterminate beams which cannot be solved by equilibrium equations and the deflection of these beams also will be calculated. 3. Thin cylinders: All types of stresses within thin cylinders and spheres under internal pressure will be calculated within this chapter. Moreover, the change in dimensions such as change in diameter, length, and volume will be conducted. 4. Thick cylinders: same previous chapter but for thick cylinders. Combined cylinders also will be introduced to show the effect of interface pressure on the stresses on both inner and outer cylinders. 5. Buckling: in this chapter, the critical buckling load will be evaluated under different types of end conditions such as: pin-pin, pin-fixed, fixed-fixed,

	pined-fixed, and fixed-free end. 6. Strain energy: Castigliano's theorem will be used in this chapter to conduct the deflection of any structure that subjected to different types of loading (Tension, compression, bending, impact). 7. Failure theories: to show different types of failure theories on different types of materials such as ductile and brittle materials. Moreover, the factor of safety of any structure will be determined.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Introduce students to the design principals and theory of beams, Provide them with the opportunity to develop useful skills at predicting materials response to stresses and strains and determine materials susceptibility to failure.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

					Outcome
Formative assessment	**Quizzes**	**5**	**25% (25)**	3,5,7,11,13	LO # 2,4,6,9,10
	Online Assignments (HW)	**2**	**4% (4)**	6,12	LO # 4, 5, 6,9.
	Onsite Assignments	**5**	**5% (5)**	2,4,6,10,12	LO # 1,3,5,8,10
	Report				
	Lab	**3**	**6% (6)**	Continuous	LO #1,2,3,7,8
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1-6
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Deflection of **determinate** beams
Week 2	Deflection of **determinate** beams
Week 3	**Indeterminate beams**
Week 4	**Indeterminate beams**
Week 5	**Thin cylinders**
Week 6	**Thin cylinders**
Week 7	**Thick cylinders**
Week 8	**Thick cylinders**
Week 9	**Buckling**
Week 10	**Buckling**
Week 11	**Strain energy**
Week 12	**Strain energy**
Week 13	**Strain energy**
Week 14	**Failure theories**
Week 15	**Failure theories**
Week 16	**Final Exams**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: deflection of simply supported beams
Week 2	Lab 2: deflection of simply supported beams
Week 3	Lab 3: deflection of simply supported beams
Week 4	Lab 4: :deflection of indeterminate beams
Week 5	Lab 5: :deflection of indeterminate beams
Week 6	Lab 6: :deflection of indeterminate beams
Week 7	Lab 7: :Buckling
Week 8	Lab 8: :Buckling
Week 9	Lab 9: :Buckling
Week 10	Lab 10: Creep Test
Week 11	Lab 11: Creep Test
Week 12	Lab 12: Creep Test

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	E.J. Hearn, strength of materials. Third edition.1997	Yes
Recommended Texts	R.C. Hibbeler, Mechanics of Materials, Prentice Hall, 7th ed., 2007	No
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition

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

Note: MarksDecimal 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 Approval

المصادقة على وصف المادة الدراسية

	Name	Date	Signature
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

13- Engineering of Metallurgy

Module Information
معلومات المادة الدراسية

Module Title	**Engineering of Metallurgy**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MEC011**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	MEC		**College**	ENG	
Module Leader	Rashaq Abdullah Mohammed		**e-mail**	rashaqabdullah@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	MSc.	
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name	Dr. Khaldoon Fadhel		**e-mail**	Khaldon77m@uoanbar.edu.iq	
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MEC 001Principle of Manufacturing Process	**Semester**	One
Co-requisites module		**Semester**	

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

Module Aims أهداف المادة الدراسية	1. To provide an understanding of the crystalline structure of metals. 2. Knowing the Iron/ Carbon phase diagram and the effect of rapid cooling, 3. To know what is the Thermal Equilibrium Diagrams? 4. To know the Heat Treatment processes, stress relieving, Annealing, full annealing, incomplete annealing, Isothermal annealing, diffusing annealing (homogenizing) annealing of casting, spherioidosing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. explain the basic concepts of metallurgy. 2. Understand of the crystalline structure, and relate chemical composition, structure and properties of metallic materials. 3. Adjust the structure and properties of metallic materials according to their applications. 4. Describe and understand Thermal Equilibrium Diagrams, Iron/ Carbon phase diagram and Heat Treatment processes
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Engineering of Metallurgy[2 hrs] Crystal structure [10 hrs] Density Computations Revision problem classes [4 hrs] Crystallographic Points, Directions, and Planes Revision problem classes [4 hrs] Alloying and SOLIDIFICATION OF METALS Revision problem classes [4 hrs] The Iron–Carbon System Revision problem classes [4 hrs] Cast Iron Heat Treatment Revision problem classes [4 hrs]

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. Also, encourage students to learn how to identify the chemical composition, structure and properties of metallic and the properties of metallic materials according to their applications. 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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	**5**	**25% (25)**	2,4,6, 10,12	LO # 1, 2
	Online Assignments (HW)	**2**	**4% (4)**	5, 12	LO # 2 and 4
	Onsite Assignments	**5**	**5% (5)**	3,5,7,11,13	LO # 2,3,4
	Report				
	Lab	**3**	**6% (6)**	3,6,9	LO # 1,2,3
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1– 3
	Final Exam	**3 hr**	**50% (50)**	16	**All**
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered

Week 1	Introduction to Engineering of Metallurgy
Week 2	Crystal structure
Week 3	Density Computations
Week 4	Crystallographic Points, Directions, and Planes
Week 5	Alloying And Solidification of Metals
Week 6	Alloying And Solidification of Metals
Week 7	Alloying And Solidification of Metals
Week 8	The Iron–Carbon System
Week 9	The Iron–Carbon System
Week 10	The Iron–Carbon System
Week 11	The Iron–Carbon System
Week 12	Cast Iron
Week 13	Cast Iron
Week 14	Heat Treatment
Week 15	Heat Treatment
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-4	**Learn the correct steps to prepare a sample for microscopy**
Week 5-8	**Learn the correct steps to check the hardness of metals**
Week 9-12	**Studying the effect of increasing the percentage of carbon on the mechanical properties and microstructure of steel**
Week 13-15	**Studying the effect of heat treatments on the mechanical properties and microstructure of steel**

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

Required Texts	Callister, W. D., & Rethwisch, D. G. (2007). Materials science and engineering: an introduction (Vol. 7, pp. 665-715). New York: John wiley& sons.	Yes
Recommended Texts	1. The metallurgy: structure, properties and heat treatment by D. J. D. and L. A. O. 2. Materials and Processes in Manufacturing by E.P Degarmo	Yes
Websites		

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval
المصادقة على وصف المادة الدراسية

	Name	Date	Signature

Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

14- Electrical Machines

Module Information معلومات المادة الدراسية					
Module Title	Electrical Machines			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MEC 012**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	MEC		**College**	ENG	
Module Leader	sattar A. Mutlag		**e-mail**	satmutt1961@uoanbar.edu.iq	
Module Leader's Acad. Title	Asset. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	sattar A. Mutlag		**e-mail**	satmutt1961@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Kadhum Ahmed Abed		**e-mail**	E-mailkadhum1968@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG 005- Fundamentals of Electrical Engineering	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Study the DC machines construction (Generator and Motor) and principle of operation. 2. Understand the various energy losses and efficiencies (mechanical and electrical) of DC Generators. 3.Understand the various energy losses and efficiencies (mechanical and electrical) as well as the speed control of a DC motor. 4. Explain the basic construction and operation of different types of transformers with the various energy loss and efficiencies as well as the basic electrical power transmission.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the constructions and principles of operation of DC machines (Generator and Motor). 2. Apply the basic principles to determine the various energy losses and efficiencies (mechanical and electrical) of DC Generators. 3. Apply the basic principles to determine the various energy losses and efficiencies (mechanical and electrical) as well as the speed control of a DC motor. 4. Identify the basic construction and operation of different types of transformers with the applying of basic principles to estimate the various energy loss and efficiencies as well as the electrical power transmission
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. DC machines construction.,. Principle of operation of DC generators[15 hrs] 2. Types of DC generators,. Losses and efficiency of DC generators[15 hrs] 3. Parallel operation of DC generators[15 hrs] 4. Principle of DC motors, Types of DC motors[15 hrs] 5. DC motors losses, efficiency, Speed control of DC motors[15 hrs] 6. Transformer construction, principle of operation of transformer[15 hrs] 7. Types of transformers ordinary, all-day, and auto[10 hrs] 8. Losses and efficiencies[15 hrs] 9. The basic principles of electrical power transmission[10 hrs]

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	12	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	2,4,5, 10,12	LO # 1, 2
	Online Assignments (HW)	**2**	**4% (4)**	6, 12	LO # 2 and 4
	Onsite Assignments	**5**	**5% (5)**	3,5,7,11,13	LO # 2,3,4
	Report				
	Lab	**3**	**6% (6)**	3,6,9	LO # 1,2,3
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO # 1– 3
	Final Exam	**3 hr**	**50% (50)**	16	**All**
Total assessment			**100% (100 Marks)**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	DC machines construction.
Week 2	Principle of operation of DC generators
Week 3	Types of DC generators
Week 4	Losses and efficiency of DC generators **+ (Monthly Exam 1)**
Week 5	Parallel operation of DC generators
Week 6	Principle of DC motors
Week 7	Types of DC motors
Week 8	DC motors losses, efficiency
Week 9	Speed control of DC motors
Week 10	Transformer construction **+ (Monthly Exam 2)**
Week 11	principle of operation of transformer
Week 12	Types of transformers ordinary, all-day, and auto
Week 13	Transformer Losses and efficiencies
Week 14	The basic principles of electrical power trans\mission. .**+ (Monthly Exam 3)**
Week 15	The basic principles of electrical power transmission
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	The construction of DC machines.
Week 2	Building-up voltage of self-exited shunt generator.
Week 3	Speed control of a DC shunt motor.
Week 4	Operation of single phase transformer

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Electrical Technology by Theraja.	No
Recommended Texts	2. Electric Machinery Fundamentals by S. Chapman.	No
Websites		

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

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

Module Approval المصادقة على وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

15- English Language II

Module Information معلومات المادة الدراسية					
Module Title	English Language II			**Module Delivery**	
Module Type	S			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOA 004				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	UGII		**Semester of Delivery**	Four	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. AbdulrahmanM. Homadi		**e-mail**	Abd.mohammed@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Dr. ZinahJumaah Ahmed		**e-mail**	Zinah.j.ahmed@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Expand vocabulary and enhance communication in everyday situations. 2. Improve grammar skills for more accurate speaking and writing. 3. Develop better listening comprehension abilities. 4. Enhance spoken English fluency, accuracy, and pronunciation. 5. Improve reading comprehension and extract key information from texts. 6. Strengthen writing skills for well-structured and grammatically accurate compositions. 7. Increase cultural awareness of English-speaking societies and customs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Develop academic essay writing proficiency 2. Promote reading skills 3. Expand academic vocabulary through reading 4. Promote speaking ability through group discussions and debates 5. Promote critical thinking skills
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Tenses - Vocabulary (Jobs) - Present simple - Present continuous - Past simple - Past continuous - Count and uncount nouns - Expression of quantity - Verb patterns - Would like and like - What … like? - Comparative and superlatives - Present perfect - Tense revision - have to & got to - have to & should & must - Present simple or will - Conditional clauses - Verb patterns - Used to - The passive form - Active and passive - Second conditional - Might - Question forms - Writing (informal letter) - Have/have to - Writing (Linking words +Describing a person) - Have + noun - Writing (a story 1) - Articles - Vocabulary (clothes) - Writing (filling in forms) - Will and going to - Writing (postcard) - Vocabulary (adjective formation) - Writing (relative closes) - Vocabulary (men and women) - Writing (a biography) - Vocabulary (job description) - Writing (formal letter) - Time clauses - Writing (discussing ideas) - Infinitives - Writing (formal letters) - Vocabulary (words with more than one meaning) - Writing (email) - Vocabulary (phrasal verbs) - Writing (a story 2)
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, speaking interactive activities and by considering type of activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2,3,5, 10,11	LO #1,2,3,4 and 5
	Online Assignments (HW)	3	6% (6)	4,6,12	LO # 2, 3 and 5
	Onsite Assignments	3	5% (5)	6,8,13	LO #2,3,4
	Report	1	4% (4)	14	LO #5
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1-3
	Final Exam	3 hr	50% (50)	16	LO #1,2,3,4 and 5
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered	
Week 1	Tenses - Vocabulary (Jobs)	- Question forms - Writing (informal letter)
Week 2	- Question forms - Writing (informal letter)	Have/have to - Writing (Linking words +Describing a person)
Week 3	- Past simple - Past continuous	- Have + noun - Writing (a story 1)
Week 4	- Count and uncount nouns - Expression of quantity	- Articles - Vocabulary (clothes) - Writing (filling in forms)
Week 5	- Will and going to - Would like and like - What … like?	- Writing (postcard) - Vocabulary (adjective formation) - Verb patterns
Week 6	- Comparative and superlatives - Present perfect	- Writing (relative closes) - Vocabulary (men and women)
Week 7	**Mid-term Exam**	
Week 8	- Tense revision - have to & got to	- Writing (a biography) - Vocabulary (job description)
	- have to & should & must - Present simple or will	- Writing (formal letter) - Time clauses
Week 9	- Conditional clauses - Verb patterns	- Writing (discussing ideas) - Infinitives
	- Used to - The passive form	- Writing (formal letters) - Vocabulary (words with more than one meaning)
Week 10	- Active and passive - Second conditional	- Writing (email) - Vocabulary (phrasal verbs)
	- Might	- Writing (a story 2)
Week 11	- Tense revision - have to & got to	- Writing (a biography) - Vocabulary (job description)
	- have to & should & must - Present simple or will	- Writing (formal letter) - Time clauses
Week 12	- Conditional clauses - Verb patterns	- Writing (discussing ideas) - Infinitives
	- Used to - The passive form	- Writing (formal letters) - Vocabulary (words with more than one meaning)
Week 13	- Active and passive - Second conditional	- Writing (email) - Vocabulary (phrasal verbs)
	- Might	- Writing (a story 2)
Week 14	- Tense revision - have to & got to	- Writing (a biography) - Vocabulary (job description)
Week 15	●Past perfect ● Hot verbs	● writing a story
Week 16	**Preparatory for final exam**	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	John & Liz Soars, "New Headway Plus- Beginner Student's Book", 10th ed 2014	Yes
Recommended Texts	-Raymond Murphy; "English Grammar in Use", 4th edition 2012 Understanding and Using English Grammar, Vol. A, 4th Edition 4th Edition	No
Websites	https://sachtienganhhn.net/pdf-embed/life-pre-intermediate-b1-student-book.html https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_style_introduction.html	

Grading Scheme
مخطط الدرجات

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

Note: MarksDecimal 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 Approval
المصادقة على وصف المادة الدراسية

	Name	Date	Signature
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	

Scientific Committee Member Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		8/6/2023	

16- Computer Science II

Module Information معلومات المادة الدراسية					
Module Title	**Computer Science II**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOA008**				
ECTS Credits	**3**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	MEC		College	ENG	
Module Leader	Dr. Mohammed Ghanem Jehad		**e-mail**	mgjehad@uoanbar.edu.iq	
Module Leader's Acad. Title	Ass. Professor Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Dr. Waleed Mohammed Abed		**e-mail**	Waleed_eng76@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course presents an overview of fundamental computer science topics. Overview topics include an introduction to computer components, computer hardware, operating systems, digitization of data, and application program (Microsoft office).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	6. Analyze, design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs. 7. Identify problems and formulate solutions for systems. 8. Communicate effectively with a range of audience. 9. Work effectively as part of a team to develop and deliver quality software artifacts. 10. Design solutions using approaches that integrate ethical, social, legal, and economic responsibilities.
Indicative Contents المحتويات الإرشادية	- Introduction of Microsoft Excel - Workbooks, Worksheets and Cell in Microsoft Excel - Formulas in Microsoft Excel - Fundamentals of Networks and Internet

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The most important strategies that will be adopted in delivering this module are: - Allow students to actively participate in the learning process with class discussions and exercises that support the initiative. - Knowledge application and Extended critical thinking - Do Summative assessments Occurs at end of chapter - Do Formative Assessment occurs through chapter to Covers complete content areas - Case-Based Learning. - Experiential learning activities in lab.

Student Workload (SWL) الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	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/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	2,3,5, 10,11	LO #1,2,3,4 and 5
	Online Assignments (HW)	2	4% (4)	6,12	LO # 3 and 5
	Onsite Assignments	5	5% (5)	4,6,8,12,13	LO #1,2,3,4 and 5
	Report				
	Lab	3	6% (6)	6,8,13	LO #2,3,4
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1-3
	Final Exam	3 hr	50% (50)	16	LO #1,2,3,4 and 5
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction of Microsoft Excel
Week 2	Workbooks and Worksheets
Week 3	Cell in Microsoft Excel
Week 4	File and Home Tab
Week 5	Insert Tab
Week 6	Layout Tab
Week 7	**Mid – term Exam**
Week 8	Formulas Tab
Week 9	Formulas Tab

Week 10	Data Tab
Week 11	Review and View Tab
Week 12	Fundamentals of Networks and Internet
Week 13	Browsing and Searching the Internet
Week 14	E-mail and E-Chatting
Week 15	The Ethics of Internet World
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction of Microsoft Excel
Week 2	Lab 2: File and Home Tab
Week 3	Lab 3: Insert and Layout Tab
Week 4	Lab 4: Formulas in Microsoft Excel
Week 5	Lab 5: Data Tab
Week 6	Lab 6: Browsing and Searching the Internet
Week 7	Lab 7: E-mail and E-Chatting

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	أساسيات الحاسوب وتطبيقاته المكتبية (الجزء الأول) (الجزء الثاني) أ.م.د. زياد محمد عبود ، أ.د.غسان حميد عبد المجيد ، أ.م.د. أمير حسين مراد ، م. بلال كمال أحمد	Yes
Recommended Texts		
Websites		

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

Note: MarksDecimal 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 Approval المصادقة على وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Engineering Statistics

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Statistics**			**Module Delivery**	
Module Type	**B**			☒**Theory** ☐**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**ENG 010**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	MEC		**College**	ENG	
Module Leader	Kadhum Ahmed Abed		**e-mail**	kadhum1968@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Kadhum Ahmed Abed		**e-mail**	kadhum1968@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Zinah J. Ahmed		**e-mail**	Zinah.j.ahmed@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG 009 Calculus-IV	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand the differentiation between a random process and a deterministic process. 2. Solve probability problems and its applications by to determine the sampled data; analyze it graphically. 3. Understand the relationship between both discrete and continuous random variables. 4. Understand the theoretical of the normal distribution with many populations in practice. 5. Learn statistical hypotheses by carrying statistical tests, using different significance levels.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course, the student should be able to: 1. Use a number of methods and techniques for collecting and presentation the sets of data. 2. Calculation and demonstration the center tendency and variation of data. 3. compute the probabilities in a simple cases and using the rules of probabilityin computing; 4. give an account of the concept random variable and be able to use some common probability distributions; 5. understand the meaning of the central limit theorem; 6. use point and interval estimates for some typical statistical problems; 7. Apply elementary regression for fitting measured data.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Fundamentals (Introduction to Statistics) (15 hrs)** - Descriptive and Inferential Statistics - Data Collection and Sampling Techniques - Observational and Experimental Studies **Presentation of a Statistical Data (15hrs)** - Organizing Data - Grouped Frequency Distributions or Frequency Distributions Table - Graphs: Histograms, Frequency Polygons, and Ogive **Data Description (15hrs)** - Measures of Central Tendency (Mean, Median and Mode) - Population Variance and Standard Deviation - Variance and Standard Deviation for Tabulated Data **Probability and Counting Rules (15hrs)** - Sample Spaces and Probability - Tree diagram and Venn Diagram - Probability and Counting Rules **Discrete Probability Distributions (10hrs)** - Probability Distributions - Mean, Variance, Standard and Deviation

	- The Binomial Distribution
	- The Poisson Distribution
	
	Continuous Probability Distributions (10hrs)
	The Normal Distribution
	- Normal Distributions
	- Finding Areas Under the Standard Normal Distribution Curve (Table Method)
	- A Normal Distribution Curve as a Probability Distribution Curve
	
	Confidence Intervals and Sample Size (10hrs)
	- Confidence Intervals for the Mean When σ is Known
	- Confidence Intervals for the Mean When σ is Unknown
	- The chi-square Distribution
	
	Hypothesis Testing (5Hrs)
	- Steps in Hypothesis Testing—Traditional Method
	  - The null hypothesis (H_0)
	  - The alternative hypothesis (H_1)
	- P-Value Method for Hypothesis Testing
	- t Test for a Mean
	- z Test for a Proportion
	- X_2 Test for a Variance or Standard Deviation
	
	Testing the Difference Between Two Means, Two Proportions, and Two Variances (5hrs)
	- Testing the Difference Between Two Means: Using the z Test
	- Testing the Difference Between Two Means of Independent Samples: Using the tTest
	- Testing the Difference Between Two Means: Dependent Samples

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	5, 10	LO #All
	Online Assignments (HW)	3	6% (6)	2, 12	LO # 3, 4, 5, 6 and 7
	Onsite Assignments	3	5% (5)	?,?,?	LO #All
	Report	1	4% (4)	?,?,?	
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO #1,2,3, 4 and 5
	Final Exam	3 hr	50% (50)	16	LO #All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Fundamentals (Introduction to Statistics)** 1. Descriptive and Inferential Statistics 2. Variables and Types of Data 3. Data Collection and Sampling Techniques / Observational and Experimental Studies
Week 2	Testing the Difference between Variance
Week 3	**Presentation of a Statistical Data** 1. Grouped Frequency Distributions or Frequency Distributions Table 2. Graphs: Histograms, Frequency Polygons, and Ogive 3. Other Types of Graphs
Week 4	Probability Distribution functions: Uniform, Binomial, Geometric and Negative Binomial, Hyper-geometric and Poisson distribution.

Week 5	Continuous random variables. Probability Density functions.
Week 6	Normal Distribution. Approximation to Binomial and Poisson, Distribution. Exponential distribution. Other continuous distributions.
Week 7	Joint probability function. Multiple discrete and continuous random variables.
Week 8	Covariance and correlation. Bivariate Normal Distribution. Linear combination of random variables. Functions of random variables.
Week 9	Parameter estimation. Properties of estimators. Method of Moments.
Week 10	Method of Maximum likelihood.
Week 11	Interval estimation. Inference on the mean of a population: variance known or unknown. Inference on the variance of a normal population
Week 12	Hypothesis testing about the mean and Proportion: Small and Large Sample
Week 13	Hypothesis testing: Two Populations
Week 14	Introduction, Data Summary and Presentation
Week 15	Probability: Addition rule, conditional probability, multiplication rule and Bayes Theorem.
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Elementary Statistics A Step by Step Approach, Eighth Edition, By Allan G. Bluman.	Yes
Recommended Texts	2. Probability and Statistics For Engineers and Scientists, Fourth Edition, By Sheldon Ross	Yes
Websites		

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

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Module Approval

المصادقةعلى وصف المادة الدراسية

	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

Heat Transfer- I

Module Information معلومات المادة الدراسية					
Module Title	**Heat Transfer – I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC013**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	MEC		**College**	ENG	
Module Leader	Hamdi E. Ahmed		**e-mail**	hamdi.ahmed@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Hamdi E. Ahmed		**e-mail**	hamdi.ahmed@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Waleed M. Abed		**e-mail**	waleed_eng76@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEC008Thermodynamics II, MEC009Fluid Mechanics II	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	5. Basic heat transfer mechanisms (conduction and radiation). 6. Heat transfer by conduction in solids for steady-state and transient conditions. 7. Heat transfer by thermal radiation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	5. To understand the conduction and radiation heat Transfer Mechanisms. 6. To recognize Heat Transfer from Finned Surfaces. 7. To derive the formula of steady-state conduction heat transfer in solids using numerical methods. 8. To solve unsteady-state conduction heat transfer in small and large bodies and also by using numerical methods. 9. To Illustrate Radiation heat transfer from different colored bodies. 10. To Describe Radiation Heat Transfer, View Factor, Diffuse, Gray Surfaces, Radiosity, and Radiation Shields.
Indicative Contents المحتويات الإرشادية	• Basic of heat transfer, [30hr]. - Mechanism of heat transfer, - Forms of heat transfer • Multi- and one dimensional conduction heat transfer, [30hr]. - Boundary and initial conditions, - Thermal resistance - Heat sources systems (heat generation), • Heat transfer from fins, Kinds of fins, fin efficiency, and fin effectiveness [30hr]. - Steady-state conduction multi-dimensions (nodal solution), - Numerical method for analysis, - Unsteady-state conduction (transient), - Lumped heat capacity system, • Transient numerical method, Transient heat conduction in plane walls, cylinders, and spheres [30hr]. • Illustrate Radiation heat transfer from different colored bodies, [30hr]. - Describe Radiation Heat Transfer, View Factor, - Diffuse, Gray Surfaces, Radiosity, and Radiation Shields .

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy 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 at the lab.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	5-10	LO #1, 2 and 5
	Online Assignments (HW)	**2**	**4% (4)**	2, 12	LO # 3, 4 and 6
	Onsite Assignments	**5**	**5% (5)**	4, 13	LO # 3, 4 and 6
	Report				
	Lab	**3**	**6% (6)**	Continuous	LO # All
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO #1,2,3,4
	Final Exam	**3 hr**	**50% (50)**	16	LO # All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic of heat transfer
Week 2	Mechanism of heat transfer,
Week 3	Forms of heat transfer.
Week 4	Multi- and one dimensional conduction heat transfer
Week 5	Boundary and initial conditions, thermal resistance
Week 6	Heat sources systems (heat generation)
Week 7	Heat transfer from fins
Week 8	Kinds of fins, fin efficiency and fin effectiveness
Week 9	Steady-state conduction multi-dimensions (nodal solution)
Week 10	Numerical method for analysis.
Week 11	Unsteady-state conduction (transient)
Week 12	Lumped heat capacity system.
Week 13	Large body method
Week 14	Transient numerical method
Week 15	Transient heat conduction in plane walls, cylinders, and spheres.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Linear Heat Conduction
Week 2	Lab 1: Linear Heat Conduction
Week 3	Lab 1: Linear Heat Conduction
Week 4	Lab 2: Thermal Insolation
Week 5	Lab 2: Thermal Insolation
Week 6	Lab 2: Thermal Insolation
Week 7	Lab 3: Radial Heat Conduction
Week 8	Lab 3: Radial Heat Conduction

Week 9	Lab 3: Radial Heat Conduction
Week 10	Lab 4: Conduction Heat Transfer from finned surface
Week 11	Lab 4: Conduction Heat Transfer from finned surface
Week 12	Lab 4: Conduction Heat Transfer from finned surface
Week 13	Lab 5: Heat Transfer by Radiation
Week 14	Lab 5: Heat Transfer by Radiation
Week 15	Lab 5: Heat Transfer by Radiation

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Yunus A. Cengel, "Heat Transfer, A Practical Approach", 2nd Edition, 2012. J. P. Holman, "Heat Transfer", 9th Edition, 2013.	Yes
Recommended Texts	F. P. Incropera& D. P. Dewitt, "Fundamentals of Heat and Mass Transfer", 2011.	Yes
Websites		

Grading Scheme
مخطط الدرجات

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

Theory of Machines-I

Module Information معلومات المادة الدراسية					
Module Title	**Theory of Machines-I**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC014**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Ahmed N. Uwayed		**e-mail**	Ahmed.noori@uoanbar.edu.iq	
Module Leader's Acad. Title	Assit. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ahmed N. Uwayed		**e-mail**	Ahmed.noori@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Khaldoon F. Brethee		**e-mail**	Khaldon77m@uoanbar.edu.iq	
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEC 002 Engineering Mechanics II (Dynamics)	**Semester**	Two
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	8. To give basic knowledge on kinematics and kinetics of machine elements. 9. Understand the principles of power transmission. 10. To teach students both graphical and analytical methods of motion analysis and design of planar mechanisms. 11. Gain the basic knowledge to analyze displacement, velocity and acceleration in mechanisms. 12. Understand theory of Hooke's joint, gyroscope, governors, and flywheel.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	10. To gain basic knowledge of kinematics and kinetics for planar mechanisms. 11. Create a schematic illustration of a working mechanism. 12. Estimate the degree of freedom of mechanisms. 13. Learning computer software to solve motion characteristics. 14. Practice the analytical solution to solve motion problems. 15. Formulate and solve for distance, velocity and acceleration analysis of planar linkages. 16. Successfully practice the concepts of power transmission and steering gear mechanisms. 17. Understand the importance of gyroscopic couple, flywheel, and governors in real time practice.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Universal Joint** [30hr]. Concepts of Hooke's joint Ratio of shafts velocities Maximum and minimum speeds driving and driven shafts Condition of equal speed s Combination of Springs Angular acceleration of driving and driven shafts **Steering Gear Mechanism**[30hr]. Concepts of correct steering Angles of rotation Davis steering mechanism and its relationships Ackerman steering mechanism and its relationships **Velocity in Mechanisms**[30hr]. Introduction Relative velocity of two links Motion of a link Motion of a point on a link Rubbing velocities in rotating links **Acceleration in Mechanisms**[30hr]. Introduction Acceleration diagram for a link Acceleration of a link Motion of a point on a link Coriolis acceleration in rotating links **Gyroscopic Couple** [15hr]. Introduction Precessional angular motion Gyroscopic couple Effect of Gyroscopic coupleon rotating bodies

	Turning moment diagram and flywheel [15hr]. Introduction Turning moment diagram of flywheel Energies during the single and double cycle

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

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	3,7,11,13	LO #1, 2, 3, 5 and 6
	Online Assignments (HW)	2	4% (4)	2, 10	LO # 2, 4, 6, 7 and 8
	Onsite Assignments	5	5% (5)	4, 11	LO # 2, 4, 6, 7 and 8
	Report				
	Lab	3	6% (6)	Continuous	LO # all
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO #1,2,3,4 and 5
	Final Exam	3 hr	50% (50)	16	LO # all
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Velocity and acceleration diagrams.
Week 2	Velocity and acceleration diagrams.
Week 3	Velocity and acceleration diagrams.
Week 4	Mechanisms with lower pairs (Hooke joint, Steering gear)
Week 5	Mechanisms with lower pairs (Hooke joint, Steering gear)
Week 6	Mechanisms with lower pairs (Hooke joint, Steering gear)
Week 7	Gyroscopic couple.
Week 8	Gyroscopic couple.
Week 9	Gyroscopic couple.
Week 10	Turning moment diagram and flywheel
Week 11	Turning moment diagram and flywheel
Week 12	Turning moment diagram and flywheel .
Week 13	Governors.
Week 14	Governors.
Week 15	Governors.
Week 16	**Final Exams**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction
Week 2-4	Lab 1: Slider-crank mechanism
Week 5-7	Lab 2: Hook's joint
Week 8-9	Lab 3: Gyroscopic couple
Week 10-12	Lab 4: Flywheel
Week 13-14	Lab 5: : Governors

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Mechanics of Machines: Elementary theory and examples. By: J. Hannah and R.C. Stephens. Mechanics of Machines: Advanced theory and examples. By: J. Hannah and R.C. Stephens.	Yes
Recommended Texts	Theory of Machine. By: R.S. Khurmi and J. K. Gupta. Kinematics and Dynamics of Machines. By: G.H. Martin.	Yes
Websites		

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	

		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

Engineering Analysis

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC015**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Ghalib R. Ibrahim		**e-mail**	ghalib.ibrahim@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ghalib R. Ibrahim		**e-mail**	ghalib.ibrahim@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Khaldoon F. Brethee		**e-mail**	Khaldon77m@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG 009-Calculus IV.	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To enhance the student's ability to think logically and mathematically in modeling systems. 2. To use ordinary differential equation for solving practical problems. 3. To knowledge the partial differential equations (PDEs) and how they can serve as models for physical processes such as mechanical vibrations, transport phenomena including diffusion, heat transfer, and advection, and electrostatics. 4. To use Fourier transforms and the convolution theorem to analyze and solve the heat equation. 5. Select and execute appropriate methods to achieve objectives. 6. Interpret and communicate the results.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand Linear Differential Equations (Homogenous and Non-Homogenous) 2. To understand solution of differential equations using Laplace Transformation 3. Solve periodic function using Fourier series. 4. Understand how the Partial Differential Equations under boundary conditions can be solved.
Indicative Contents المحتويات الإرشادية	**Differential Equations (D.E) [20hrs]** Linear Differential Equations (L.D.E) A. Homogeneous D.E B. Non- Homogeneous D.E **Matrices [15hrs]** 1. Definition 2. Operations on Matrices 3. The Transpose of a Matrix 4. Determinants 5. Adjoint of a Matrix 6. Inverse of a Matrix 7. System of Linear Equations 8. Eigenvalues and Eigenvectors **Special Functions [10hrs]** 1. Gamma Function 2. Beta Function **Laplace Transformation [20hrs]** 1. Definition of Laplace Transform A. Laplace Transform Formulas B. Laplace Transform Properties 2. The Inverse Laplace Transform

	A. Inverse Laplace Transform Properties B. Methods of Solution of Inverse Laplace Transform 3. Solution of Differential Equations using Laplace Transformation 4. Solution of the Simultaneous Differential Equations using Laplace Transformation Revision problem classes **Fourier Series [20hrs]** 1. Periodic Function 2. Euler Formulas 3. Even and Odd Functions 4. Half Range Expansions Revision problem classes **Partial Differential Equations [20hrs]** 1. Definitions 2. Formation of Partial Differential Equations 3. Solution of Partial Differential Equations under boundary conditions A. Direct Integration Method B. Separation of Variable Method C. Laplace Transform Method **Applications of Partial Differential Equations[20hrs]** - One Dimensional Wave Equation - One Dimensional Heat Flow Equation Revision problem classes

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. Also, encourage students to learn various methods for analyzing the time response, frequency response and stability of the systems. 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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	5, 10	LO #All
	Online Assignments (HW)	3	6% (6)	2, 12	LO # 3and 4
	Onsite Assignments	3	5% (5)	4, 10	LO # 3and 4
	Report	1	4% (4)	11	LO #All
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1-4
	Final Exam	3 hr	50% (50)	16	LO #All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Differential Equations (D.E)
Week 2	Matrices
Week 3	Matrices
Week 4	Special Functions
Week 5	Special Functions
Week 6	Laplace Transformation
Week 7	Laplace Transformation
Week 8	Laplace Transformation
Week 9	Fourier Series
Week 10	Fourier Series

Week 11	Fourier Series
Week 12	Partial Differential Equations
Week 13	Partial Differential Equations
Week 14	Partial Differential Equations
Week 15	Revision problem classes
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Zill, D., Wright, W. S., & Cullen, M. R. (2011). Advanced engineering mathematics. Jones & Bartlett Learning.	Yes
Recommended Texts	Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, 2011, John Wiley.	Yes
Websites		

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

Internal Combustion Engines

Module Information معلومات المادة الدراسية					
Module Title	**Internal Combustion Engines**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC 016**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr.Ahmed Ali Najeeb		**e-mail**	Ashaab_1977@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Dr.Ahmed Ali Najeeb		**e-mail**	Ashaab_1977@uoanbar.edu.iq	
Peer Reviewer Name	Dr.Waleed Mohammed		**e-mail**	waleed_eng76@uoanbar.edu.iq	
Scientific Committee Approval Date	07/06/2023		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEC 008 Thermodynamics-II	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Teaching students how to classify engines and their components and calculate efficiency. 2. Study of standard air cycles and how to calculate workout and mean effective pressure and efficiency for each standard cycle. 3. Solve fuel-air and actual cycles and how to calculate their efficiency and apply them to the engines when the temperature is the specific heat as a function of temperature. 4. Study the chemical reactions and calculate the amount of heat produced by the combustion process. As well as calculating the air to fuel ratio (A/F). 5. Study fuels and know the properties of each fuel and the relationship between fuels.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamentals, operation, and performance of internal combustion engines and their different types. 2. Understand and calculate the various performance parameters of the engines. 3. Identify Otto, Disel, and Combined Cycles. Analysis of Intake and Exhaust. 4. Comparison between three cycles Otto, Disel, and Combined Cycles . 5. Apply measurement of fuel and air consumption, volumetric efficiency, effect of air-fuel ratio . 6. Apply compression ratio on engine power & efficiency, pumping work. 7. Air – Fuel cycle and their analysis . 8. Actual Fuel-Air cycle with changing C_P and C_V with temperature . 9. Discover Fuels and Combustion, Gasoline characteristics, alcohol refining and octane & cetane rating, diesel fuel oil classification, combustion equation. 10. Discover knock and the engine variable detonation, combustion theories, chemical equilibrium and dissociation, energy charts for unburned air mixtures, combustion chamber requirement.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

	Engine Types and Their Operation, [20hrs] • Heat Engine, • External and Internal Combustion Engines • Engines Calcinations, • Main Components of I.C. Engines • Tirmonelegy of I.C. Engines, • Operating of I.C. Engines **Air standard Cycles. And their Analysis[20hrs]** • Otto Cycle, • Diesl Cycle, • Dual Cycle, • Comparison between Otto , Diesl and Dual Cycles, Fuel-Air Cycles, and Actual Cycles, Composition of Cylinder Gases **[10hrs]** Fuel-Air Cycles, and Actual Cycles, Variable of Specific Heats **[10hrs]** Actual Cycles and Their Analysis , Time loss factor **[10hrs]** • Comparison Between Air Standard Cycles and Actual Cycles **Combustion Processes, [10hrs]** • Analysis of Combustion Products **Thermochemistry of Fuel-Air Mixtures, [10hrs]** • Combustion Equations • Analysis of Experimental Combustion Products **Fuel Types , [10hrs]** • Gasoline and • Diesel Fuel • Research and Motor Octane Number,

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The most important strategies that will be adopted in delivering this module are: - Incorporate flexible seating into my classroom - Knowledge application and Extended critical thinking - **Do** Formative Assessment occurs through chapter to Covers complete content areas - Case-Based Learning.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	3,7,11,13	LO # 1, 2,3,9 and 10
	Online Assignments (HW)	2	4% (4)	2, 10	LO # 4,5 and 6
	Onsite Assignments	5	5% (5)	4, 11	LO # 4,5 and 6
	Report				
	Lab	3	6% (6)	Continuous	LO # 1-7
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # All
	Final Exam	3 hr	50% (50)	16	LO #All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Engine Types and Their Operation, Engine Design and Operating Parameters.
Week 2	Engine Types and Their Operation, Engine Design and Operating Parameters.
Week 3	Engine Types and Their Operation, Engine Design and Operating Parameters.
Week 4	Air standard Cycles.
Week 5	Air standard Cycles.
Week 6	Air standard Cycles.
Week 7	Med Exam
Week 8	Fuel-Air Cycles, and Actual Cycles.
Week 9	Fuel-Air Cycles, and Actual Cycles.

Week 10	Fuel-Air Cycles, and Actual Cycles.
Week 11	Thermochemistry of Fuel-Air Mixtures.
Week 12	Thermochemistry of Fuel-Air Mixtures.
Week 13	Thermochemistry of Fuel-Air Mixtures.
Week 14	Fuel Types.
Week 15	Fuel Types.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 2-4	Calculate the air consumption rate of a diesel engine.
Week 5-7	Calculate the fuel consumption rate of a diesel engine
Week 8-10	Calculating and graphical representation of the braking power for the diesel engines
Week 11-14	Evaluate the performance of a four-stroke diesel engine

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Internal Combustion Engine Fundamentals by J.B. Heywood	Yes
Recommended Texts	Introduction to I. C. Engines by Richard Stone	Yes
Websites		

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

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

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

Module Approval

المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

Gas Dynamics

Module Information معلومات المادة الدراسية					
Module Title	**Gas dynamics**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MEC017**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	MEC		**College**	ENG	
Module Leader	Mohammed Ghanem Jehad		**e-mail**	mgjehad@uoanbar.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Mohammed Ghanem Jehad		**e-mail**	mgjehad@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Waleed Mohammed		**e-mail**	waleed_eng76@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEC008-Thermodynamics II, MEC009- Fluid Mechanics-II	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the compressible flow fundamentals. 2. To solve isentropic flow in variable area ducts. 3. To understand various shock wave situations and the use of gas tables. 4. To study the compressible flow with friction. 5. To study the compressible flow with heat transfer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- **Understand** the wave propagation phenomenon in subsonic, sonic and supersonic gas flows. 2- **Solve** one dimensional compressible flow problems in changing area ducts 3- **Analyze** the relation between pressure and gas velocity in nozzles and jet engines 4- **Analyze** compressible flow having normal shock wave (stationary and moving) types 5- **Solve** compressible flow having normal shock wave (stationary and moving) types 6- **Analyze** compressible flow having oblique shock wave (stationary and reflected) types 7- **Solve** compressible flow having oblique shock wave (stationary and reflected) types 8- **Analyze** the gas flow in constant area duct with friction effects (Fanno flow). 9- **Determine** the properties of the flow in constant area duct with friction (Fanno flow) and its applications. 10- **Determine** the properties of the flow in constant area duct with heat transfer (Rayleigh flow) and its applications. 11- **Solve** compressible flow through constant area duct with heat transfer (Rayleigh flow)
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Explores fundamentals of gas dynamics and compressible fluid flow including One-dimensional isentropic flow [15 hrs] Flow in variable area ducts; nozzles and diffusers [10 hrs] Normal shock relations; oblique shocks and expansion waves [10 hrs] The moving normal shock wave [10 hrs] The reflected oblique shock wave [10 hrs] Fanno curve and Fanno flow equations, solution of Fanno flow equations, variation of flow properties [15 hrs] One-dimensional flow with friction [10 hrs] Rayleigh curve and Rayleigh flow equations, variations of flow properties, maximum heat transfer, tables and charts for Rayleigh flow. [10 hrs] One-dimensional flow heating or cooling [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The most important strategies that will be adopted in delivering this module are: - Allow students to actively participate in the learning process with class discussions and exercises that support the initiative. - Incorporate flexible seating into my classroom - Knowledge application and Extended critical thinking - **Do Summative assessments** Occurs at end of chapter - **Do** Formative Assessment occurs through chapter to Covers complete content areas - Case-Based Learning.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	4, 9	LO # 1, 2,3,9, 10 and 11
	Online Assignments (HW)	3	6% (6)	3, 12	LO # 4,5 and 6
	Onsite Assignments	3	5% (5)	4, 11	LO # 4,5 and 6
	Report	1	4% (4)	13	LO # 7 and 8
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1, 2,3, 4,5, 6 and 7
	Final Exam	3 hr	50% (50)	16	LO # All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Wave propagation phenomenon in subsonic, sonic and supersonic gas flows.
Week 2	One-dimensional isentropic flow.
Week 3	The relation between pressure and gas velocity in nozzles and jet engines.
Week 4	Compressible flow having stationary normal shock wave.
Week 5	Compressible flow having moving normal shock wave.
Week 6	Compressible flow having oblique shock wave.
Week 7	Mid-term Exam
Week 8	Compressible flow having reflected oblique shock wave.
Week 9	The gas flow in constant area duct with friction effects.
Week 10	Fanno curve and Fanno flow equations.
Week 11	Solution of Fanno flow equations.
Week 12	Variation of flow properties in Fanno flow.
Week 13	One-dimensional flow heating or cooling.
Week 14	Rayleigh curve and Rayleigh flow equations, variations of flow properties.
Week 15	Maximum heat transfer, tables and charts for Rayleigh flow.
Week 16	Preparatory week before the final Exam

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	.James E.A. John , Theo G. Keith ," Gas Dynamics'', 3rd Edition,John-Wiely,2006	Yes
Recommended Texts	John D. Anderson, Jr. Curator ," Modern Compressible	No

	Flow. With Historical Perspective". 3rd Edition, Mc-Graw Hill, 2003	
Websites	https://www.uoanbar.edu.iq/EngineeringCollege/CMS.php?ID=15	

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

Engineering Numerical Methods

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Numerical Methods**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENG 011**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Ghalib R. Ibrahim		**e-mail**	ghalib.ibrahim@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ghalib R. Ibrahim		**e-mail**	ghalib.ibrahim@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Khaldoon F. Brethee		**e-mail**	Khaldon77m@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG 009 Calculus-IV	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To enhance the student's ability to think logically and mathematically in modeling systems. 2. To use numerical methods to solve ordinary differential equation. 3. To knowledge Numerical Solutions of Partial Differential Equationsand how they can serve as models for physical processes such as mechanical vibrations, transport phenomena including diffusion, heat transfer, and advection, and electrostatics. 4. Select and execute appropriate methods to achieve objectives. 5. Interpret and communicate the results.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. find roots of functions by using a range of methods 2. solve systems of linear and non-linear and non-linear algebraic equations by using a range of methods 3. apply numerical interpolation, differentiation, integration and solving engineering problem 4. use techniques for solving ordinary differential equations 5. Use MATLAB or other numerical tools for solving problems by numerical methods.
Indicative Contents المحتويات الإرشادية	part-I: Basic Tools Unit-1: Error Analysis **[15hrs]** • Measuring Errors • Sources of Error • Consistency, Order, Smoothness and Convergence **Unit-2**: Roots of equations (Nonlinear Equations) **[20hrs]** • Bisection Method • False-Position Method (Optional) • Newton-Raphson Method • Secant Method (Optional) **Unit-3**: Simultaneous Linear algebraic Equations **[25hrs]** - Gauss-Elimination method (simple and partial pivoting methods) - Gauss-Jordan Method - Matrix Inversion method • Indirect (Iterative) Method - Jacobi Method - Gauss-Seidel Method - Successive Over-Relaxation Method **Unit-4**: Numerical Differentiation and Integration **[25hrs]** - Numerical differentiation using difference method - Numerical Integration, Trapezoid and Simpson's Rules - Extrapolation of Errors Unit-5: Interpolation and Curve Fitting **[15hrs]** - Direct Fit Polynomial - Least Squares Method

	- Logarithmic regression (Optional) - Exponential regression (Optional) - Linear interpolation , Quadratic Interpolation - Lagrange Interpolation (Optional) - Newton Divided Difference Interpolation (Optional) Part-II: Numerical Solutions of Ordinary Differential Equations **Unit-6**: Initial Value Problem **[15hrs]** - Euler's Method - Runge-Kutta 2nd - Runge-Kutta 4th - Higher Order Equations **Unit-7**: Boundary Value Problem **[10hrs]** - Equilibrium (Finite Difference) Method **Part-III: Numerical Solutions of Partial Differential Equations**

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. Also, encourage students to learn various methods for analyzing the time response, frequency response and stability of the systems. 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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	5- 10	LO #1, 2 and 5
	Online Assignments (HW)	2	4% (4)	2, 11	LO # 3, 4 and 5
	Onsite Assignments	5	5% (5)	4, 12	LO # 3, 4 and 5
	Report				
	Lab	3	6% (6)	Continuous	LO # All
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO #1,2,3 and 4
	Final Exam	3 hr	50% (50)	16	LO # All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Error Analysis
Week 2	Roots of equations
Week 3	Roots of equations
Week 4	Simultaneous Linear algebraic Equations
Week 5	Numerical Differentiation and Integration
Week 6	Numerical Differentiation and Integration
Week 7	Interpolation and Curve Fitting
Week 8	Initial Value Problem (Euler's Method & Runge-Kutta 2nd)
Week 9	Initial Value Problem (Euler's Method & Runge-Kutta 2nd)
Week 10	Initial Value Problem (Runge-Kutta 4th&Higher Order Equations)
Week 11	Initial Value Problem (Runge-Kutta 4th&Higher Order Equations)
Week 12	Boundary Value Problem (Finite Difference Method)
Week 13	Boundary Value Problem (Finite Difference Method)
Week 14	Numerical Solutions of Partial Differential Equations
Week 15	Numerical Solutions of Partial Differential Equations
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 2-4	Simultaneous Linear algebraic Equations(Matlab)
Week 5-7	Interpolation and Curve Fitting(Matlab)
Week 8-10	Initial Value Problem (Euler's Method & Runge-Kutta 2nd) in Matlab
Week 11-14	Initial Value Problem (Runge-Kutta 4th&Higher Order Equations) in Matlab

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Numerical Methods for Engineers, S. C. Chapra and R. P Canale, McGraw-Hill, 6th edition 2010.	Yes
Recommended Texts		
Websites		

Grading Scheme
مخطط الدرجات

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

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

Module Approval
المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		8/6/2023	
Peer Reviewer Approval		8/6/2023	
Scientific Committee Member Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		8/6/2023	

Heat Transfer- II

Module Information معلومات المادة الدراسية					
Module Title	**Heat Transfer II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC018**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	MEC		**College**	ENG	
Module Leader	Hamdi E. Ahmed		**e-mail**	hamdi.ahmed@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Hamdi E. Ahmed		**e-mail**	hamdi.ahmed@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Waleed M. Abed		**e-mail**	waleed_eng76@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEC013Heat Transfer-I	**Semester**	Five
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Basic heat transfer mechanisms (Convection). 2. Laminar and turbulent flow regimes through internal and external geometries. 3. Heat Exchangers. 4. Boiling and Condensation heat transfer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To understand the free and forced convection heat Transfer Mechanisms. 2. To recognize the internal and external convection heat transfer. 3. To distinguish the laminar and turbulent convection heat transfer of internal and external flows. 4. To illustrate convection heat transfer from fins. 5. To solve the combined free and forced (Mixed) convection heat transfer.
Indicative Contents المحتويات الإرشادية	• Physical Mechanism of Convection, [30hr]. - Classification of Fluid Flows, - Thermal Boundary Layer, - Hydraulic boundary layer. • External Forced Convection, [30hr]. - Parallel Flow over Flat Plates, and - Flow across Cylinders and Spheres, - Flow across Tube Banks • Internal Forced Convection, [30hr]. - Laminar Flow in Tubes, the Entrance Region, - Turbulent Flow in Tubes • Natural Convection from Finned Surfaces, [20hr]. • Natural Convection inside Enclosures, [20hr]. • Combined Natural and Forced Convection [20hr].

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy 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 at the lab.

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	5, 10	LO #1, 2 and 5
	Online Assignments (HW)	2	4% (4)	2, 10	LO # 3, 4 and 5
	Onsite Assignments	5	5% (5)	4, 12	LO # 3, 4 and 5
	Report				
	Lab	3	6% (6)	Continuous	LO #1,2,3,4 and 5
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO #1,2,3 and 4
	Final Exam	3 hr	50% (50)	16	LO #All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Physical Mechanism of Convection
Week 2	Classification of Fluid Flows.
Week 3	Thermal Boundary Layer
Week 4	Hydraulic boundary layer.
Week 5	External Forced Convection
Week 6	Parallel Flow over Flat Plates.

Week 7	Flow across Cylinders and Spheres
Week 8	Flow across Tube Banks
Week 9	Internal Forced Convection
Week 10	Laminar Flow in Tubes
Week 11	The Entrance Region.
Week 12	Turbulent Flow in Tubes
Week 13	Natural Convection from Finned Surfaces
Week 14	Natural Convection inside Enclosures
Week 15	Combined Natural and Forced Convection
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Natural and forced Convection Heat Transfer
Week 2	Lab 1: Natural and forced Convection Heat Transfer
Week 3	Lab 1: Natural and forced Convection Heat Transfer
Week 4	Lab 2: Double Pipe Heat Exchangers (effect of flow direction)
Week 5	Lab 2: Double Pipe Heat Exchangers (effect of flow direction)
Week 6	Lab 2: Double Pipe Heat Exchangers (effect of flow direction)
Week 7	Lab 3: Double Pipe Heat Exchangers (effect of flow direction)
Week 8	Lab 3: Double Pipe Heat Exchangers (effect of flow direction)
Week 9	Lab 3: Double Pipe Heat Exchangers (effect of flow direction)
Week 10	Lab 4: Double Pipe Heat Exchangers (effect of mass flowrate)
Week 11	Lab 4: Double Pipe Heat Exchangers (effect of mass flowrate)
Week 12	Lab 4: Double Pipe Heat Exchangers (effect of mass flowrate)
Week 13	Lab 5: Double Pipe Heat Exchangers (effect of inlet fluid temperature)
Week 14	Lab 5: Double Pipe Heat Exchangers (effect of inlet fluid temperature)
Week 15	Lab 5: Double Pipe Heat Exchangers (effect of inlet fluid temperature)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Yunus A. Cengel, "Heat Transfer, A Practical Approach", 2nd Edition, 2012. J. P. Holman, "Heat Transfer", 9th Edition, 2013.	Yes
Recommended Texts	F. P. Incropera& D. P. Dewitt, "Fundamentals of Heat and Mass Transfer", 2011.	Yes
Websites		

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	

		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

Theory of Machines-II

Module Information معلومات المادة الدراسية					
Module Title	**Theory of Machines-II**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC019**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Ahmed N. Uwayed		**e-mail**	Ahmed.noori@uoanbar.edu.iq	
Module Leader's Acad. Title	Assit. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Ahmed N. Uwayed		**e-mail**	Ahmed.noori@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Khaldoon F. Brethee		**e-mail**	Khaldon77m@uoanbar.edu.iq	
Scientific Committee Approval Date	1/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEC014 - Theory of Machines-I	**Semester**	Five
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To give basic knowledge on kinematics and kinetics of machine elements. 2. Understand the principles of power transmission. 3. To teach students both graphical and analytical methods of motion analysis and design of planar mechanisms. 4. Understand of techniques for studying angular and linear motion of rotating machines. 5. By the end of this course student will be able to achieve complete analysis of mechanism including (cams, gears, gear trains, and belt drive)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To gain basic knowledge of kinematics and kinetics for planar mechanisms. 2. Apply the kinematic analysis in subsequent courses in the design and analysis of various machine components. 3. Identify gear and gear train parameters and perform analysis and kinematical design of gear trains. 4. To learn the analysis and design of cam system and perform static and dynamic balancing of rotating machinery. 5. Estimate the degree of freedom of mechanisms. 6. Learning computer software to solve motion characteristics. 7. Create a schematic illustration of a working mechanism
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Balancing of Rotating Masses**[30hr]. Introduction - Balancing of rotating masses Balancing of rotating masses in the same Plane Balancing of rotating masses in different Planes **Spur Gears**[30hr]. Introduction Terms used in Spur gears Formulas of rotational speeds and number of teeth Sliding velocity Minimum number of teeth on wheel and pinion to avoid interference **Gear Trains**[30hr]. Introduction Types of gear trains Simple gear train Compound gear train Reverted gear train Epicyclic gear train **Belt Drives**[30hr]. Introduction Types of belt drives Open belt drive Crossed belt drive Angle of contact Tight and slack sides tension. **Cams**[30hr]. Introduction Types of cams Linear and angular velocities of cams

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

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	3,7,11,13	LO #1, 2, 3, 5 and 6
	Online Assignments (HW)	**2**	**4% (4)**	2, 10	LO # 2, 4, 6 and 7
	Onsite Assignments	**5**	**5% (5)**	4, 11	LO # 2, 4, 6 and 7
	Report				
	Lab	**3**	**6% (6)**	Continuous	LO # All
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	9	LO #1,2,3,4 and 5
	Final Exam	**3 hr**	**50% (50)**	16	LO # All
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

	Material Covered
Week 1	Balancing of rotating masses
Week 2	Balancing of rotating masses
Week 3	Balancing of rotating masses
Week 4	Spur Gearing
Week 5	Spur Gearing
Week 6	Spur Gearing
Week 7	Gear Trains
Week 8	Gear Trains
Week 9	Gear Trains
Week 10	Belt Drives
Week 11	Belt Drives
Week 12	Belt Drives
Week 13	Cams
Week 14	Cams
Week 15	Cams
Week 16	**Final Exams**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction
Week 2-4	Lab 1: Statistical procedure to find the best fit for a set of experimental data.
Week 5-7	Lab 2: Static balancing of rotating masses.
Week 8-10	Lab 3: Dynamic balancing of rotating masses.
Week 11-14	Lab 4: Determination of moment of inertia of a flywheel.

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Mechanics of Machines: Elementary theory and examples. By: J. Hannah and R.C. Stephens. 2. Mechanics of Machines: Advanced theory and examples. By: J. Hannah and R.C. Stephens.	Yes
Recommended Texts	○ Theory of Machine. By: R.S. Khurmi and J. K. Gupta. ○ Kinematics and Dynamics of Machines. By: G.H. Martin.	No
Websites		

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee		**8/6/2023**	

Member Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		8/6/2023	

Manufacturing Processes

Module Information معلومات المادة الدراسية					
Module Title	Manufacturing Processes			**Module Delivery**	
Module Type	C			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	MEC 020				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	MEC		**College**	ENG	
Module Leader	Zinah Jumaah Ahmed		**e-mail**	Zinah.j.ahmed@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Zinah Jumaah Ahmed		**e-mail**	Zinah.j.ahmed@uoanbar.edu.iq	
Peer Reviewer Name	Sattar A. Mutlag		**e-mail**	satmutt1961@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEC 011 - Engineering Metallurgy	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1.Understand the practical concepts of engineering materials and their properties and applications. 2. Apply the knowledge of material properties and material selection foundations that are related to mechanical Engineering program.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1 Obtain important information of the mechanical properties of materials. 2. Classified the materials. 3. Select the optimal material for each application. 4. Analyze any type of failure and find the reasons of failure. 5. know the developments of new materials. 6. To gain information about different bulk deformation processes (forging, rolling, extrusion, drawing) 7. To gain knowledge about the nonconventional machining processes 8. An ability to understand the theory of metal machining.
Indicative Contents المحتويات الإرشادية	• **Properties of materials[25hrs]** - Mechanical tensile properties, - fatigue cyclic stresses, - stress life behavior, - S-N curves. - Factor affecting fatigue life, - safe-life predication. - Creep test, • **Classification of materials[25hrs]** - ferrous and nonferrous metals, properties, classification). • **Polymer structures,[25hrs]** - hydrocarbon molecules, - thermoplastic and thermosetting. - Stress-strain behavior. - plastic, fibers, ceramic structure and properties, silicate ceramics, glasses and glass ceramic, clay products, cements, advanced ceramics. • **Composites materials, [25hrs]** - fiber composite, large-particle composites, - dispersions strengthened composite, - matrix phase, polymer-matrix composites,

	- martials selection Materials • **Selection Methodology, [25hrs]** - Ranking the materials by their ability to meet the objectives. - deformation process (rolling, forging, extrusion, wire and rod drawing and sheet metal deformation)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Manufacturing Processes is compulsury course which is offered to 3th year for Mechanical Engineering Department students and equips students to study the properties of engineering materials well as the limits of their use and the classification of these materials according to their structure. Also, the selecting methods of engineering materials for each application are investigated. The course material is presented in a series of online or face-to-face lectures and/or videos of the manufacturing processes. Students are expected to conduct a significant amount of self-directed learning for this module. The core teaching material is supplemented by weekly tutorial sessions. With a strong emphasis on understanding deformation process (rolling, forging, extrusion, wire and rod drawing and sheet metal deformation) and Other deformation processes related to them. as well as applying their knowledge to current research projects within the School of Engineering.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	5- 10	LO #All
	Online Assignments (HW)	3	6% (6)	2, 10	LO # 3, 4, 5, 6 and 7
	Onsite Assignments	3	5% (5)	4, 12	LO # 3, 4, 5, 6 and 7
	Report	1	4% (4)	13	LO #All
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO #1,2,3, 4 and 5
	Final Exam	3 hr	50% (50)	16	LO #All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Material Properties
Week 2	Mechanical Properties
Week 3	Temperature Effect
Week 4	Physical Properties
Week 5	Fluid Properties
Week 6	Engineering Materials (Ferrous Metal)
Week 7	Engineering Materials (Nonferrous Metal)
Week 8	Engineering Materials (Non-metallic)
Week 9	Designation the Engineering Materials
Week 10	Selection of Materials
Week 11	Bulk deformation
Week 12	Bulk deformation
Week 13	Rolling
Week 14	Forging
Week 15	Extrusion
Week 16	WIRE AND BAR DRAWING

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Materials and processes in manufacturing , 10th Edition, 2008. J T. Black, R. A. Kohser and E. P. Degarmo, 2- Materials Science and Engineering an Introduction William D. Callister, Jr.	Yes
Recommended Texts	1. Foundations of Materials Science and Engineering, by William F. smith & Javad Hashemi 2. Ceramic Science for Materials Technologist by T.J Mc-Calm 3. Engineering with polymers by P.C. Powel 4. Manufacturing Engineering and Technology by Kalpakjian	Yes
Websites		

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

Renewable and Sustainable Energy

Module Information معلومات المادة الدراسية					
Module Title	**Renewable andSustainable Energy**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC 021**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	MEC		**College**	ENG	
Module Leader	Mohammed Ghanem Jehad		**e-mail**	mgjehad@uoanbar.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Mohammed Ghanem Jehad		**e-mail**	mgjehad@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Saad M. Jalil		**e-mail**	saad.jalil@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MEC 13 - Heat Transfer-II	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To understand the various forms of conventional energy resources 2. To haveknowledge on Renewable and Sustainable Energy. 3. To learn the present energy scenario and the need for energy conservation 4. To compare the renewable energy sources with the conventional sources. 5. To be catalyst for awareness about the Renewable Energy and Energy Conservation in the Society. 6. To be familiar with outline division aspects and utilization of renewable energy sources for both domestics and industrial application. 7. To analyze the environmental aspects of renewable energy resources.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- **Describe** the environmental aspects of non-conventional energy resources. 2- **Compare** theconventional and non-conventional energy resources and identify their prospects and limitations 3- **Calculate** the major parameters of sun movement, solar radiation, and tracking systems. 4- **Solve**the operation and comparative analysis of flat plate solar collector systems. 5- **Know** the operation and comparative analysis of different concentrating solar power systems. 6- **Design** the parameters of a consumer scale stand alone and grid connected photovoltaic system. 7- **Evaluate** economic efficiency of photovoltaic system. 8- **Understand** concepts of wind power systems. 9- **Understand** concepts of hydraulic power systems. 10- **Compare** the hydraulic turbines. 11- **Understand** concepts of geothermal and marine power systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Non-renewable& Renewable Energy Resources; Advantages of non-conventional energy sources [10hrs] Advantages and disadvantages of non-conventional energy sources [10hrs] The physics of solar radiation; sky radiation [10hrs] Calculation of radiation intercepted by surface beam. [10hrs] Thermal Energy Losses from Solar Collector and the amount of heat absorbed by the collector [15 hrs] The principal working of PV cell and calculation the power of the domestic house devices [10 hrs] The principal working of wind energy [10 hrs] General layout of a hydroelectric power plant and classification of hydraulic turbines [10 hrs] Geothermal energy, flash power plant, dry steam power plant and binary steam power plant [15hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	The most important strategies that will be adopted in delivering this module are: - Allow students to actively participate in the learning process with class discussions and exercises that support the initiative. - Incorporate flexible seating into my classroom - Knowledge application and Extended critical thinking - **Do summative assessments** occurs at end of chapter - **Do f**ormative assessment occurs through chapter to covers complete content areas - Case-Based Learning.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	4, 9	LO # 1, 2,3,9, 10 and 11
	Online Assignments (HW)	3	6% (6)	3, 10	LO # 4,5 and 6
	Onsite Assignments	3	5% (5)	4, 12	LO # 4,5 and 6
	Report	1	4% (4)	13	LO # 7 and 8
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1-7
	Final Exam	3 hr	50% (50)	16	LO # All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Non-renewable& Renewable Energy Resources.
Week 2	Advantages and disadvantages of non-conventional energy sources.
Week 3	The physics of solar radiation; sky radiation.
Week 4	Calculation of radiation intercepted by surface beam.
Week 5	Thermal energy losses from solar collector.
Week 6	The amount of heat absorbed by the collector and classification of different concentrating solar power systems.
Week 7	Mid-term Exam
Week 8	The principal working of PV cell.
Week 9	Calculation the power of the domestic house devices.
Week 10	The principal working of wind energy.
Week 11	Classification ofdifferent wind turbines types.
Week 12	General layout of a hydroelectric power plant.
Week 13	Classification of hydraulic turbines.
Week 14	The principal working of geothermal power plants.
Week 15	classification ofgeothermal power plants.
Week 16	Preparatory week before the final Exam

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	John N.Duffie, "Solar Energy Thermal Process" John Wiley&Sons, 2013.	No
Recommended Texts	Soteris A. Kalogirou, "Solar Energy Engineering Processes and Systems" Academic Press is an imprint of Elsevier, 2014.	No
Websites	https://www.uoanbar.edu.iq/EngineeringCollege/CMS.php?ID=15	

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

Note: MarksDecimal 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 Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee		**8/6/2023**	

Member Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		8/6/2023	

Industrial Engineering and Economic Analysis

Module Information معلومات المادة الدراسية					
Module Title	**Industrial Engineering and Economic Analysis**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MEC 022**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	MEC		**College**	ENG	
Module Leader	Sattar A. Mutlag		**e-mail**	satmutt1961@uoanbar.edu.iq	
Module Leader's Acad. Title	Asset. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Sattar A. Mutlag		**e-mail**	satmutt1961@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Zinah J. Ahmed		**e-mail**	Zinah.j.ahmed@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ENG 009 Calculus-IV	**Semester**	Four
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand the theoretical workings of the organization structures & types, Productivity, basic concepts, classification, measurement and improvement. 2. Using operation research to understand the relationship between a facility layout location criterion, equipment and utilities layout, types of layout and Material handling systems and optimization. 3. Solve demand forecasting, , material requirement planning MRP, Bill of material (BOM) and Inventory models and Just in time (JIT) 4. Use statistical methods in industrial engineering. 5. Learn Industrial safety and application. 6. To determine the direct cost, indirect cost, and economy.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An ability to understand the theoretical workings of the organization structures & types, Productivity, basic concepts, classification, measurement and improvement. 2. An ability to planning of plant using the relationship between a Plant location criterion, equipment and utilities layout, types of layout and Material handling systems. Bill of material (BOM) 3. To gain experience problem solving based on operation research 4. An ability to applications of engineering economics and statistical engineering in industrial organization. 5. Learn proper Industrial safety and application.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Plant layout: - Define organization structures & types, Productivity, basic concepts, classification, measurement and improvement.[20hrs] - Define plant layout, Describe the objective and principles of plant layout. - Explain Process Layout, Product Layout and Combination Layout. Operations Research: - Introduction to Operations Research and its applications, [30hrs] - Define Linear Programming Problem, - Solution of L.P.P. by graphical method, - Evaluation of Project completion time by Critical Path Method and PERT (Simple problems) - Explain distinct features of PERT with respect to CPM. Inventory Control: - Classification of inventory. Objective of inventory control. [20hrs] - Describe the functions of inventories. - Explain and Derive economic order quantity for Basic model. (Solve numerical) . - Define and Explain ABC analysis.

	Plant maintenance: - Describe the objectives of plant maintenance. [20hrs] - Describe the duties, functions and responsibilities of plant maintenance department. - Describe the types of maintenance: Preventive, Breakdown, Scheduled and Predictive maintenance. Inspection and Quality Control: Define Inspection and Quality control. [20 hrs] - Describe planning of inspection. - Describe types of inspection. - Study of factors influencing the quality of manufacture. - Explain the Concept of statistical quality control, Control charts (X, R, P and C - charts). - Solve related problems. Contemporary Quality Management concepts [15hrs] - Concept of total quality management (TQM) 8.2 ISO-9000/14000, - Evolution and implications of JIT, Six Sigma, 7S, Lean manufacturing.

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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	5, 10	LO #1, 2, 3 and 5
	Online Assignments (HW)	3	6% (6)	2, 10	LO # 2, 4, 5, 6, 7 and 8
	Onsite Assignments	3	5% (5)	4, 12	LO # 2, 4, 5, 6, 7 and 8
	Report	1	4% (4)	13	LO # All
	Lab				
Summative assessment	Midterm Exam	2 hr	10% (10)	9	LO # 1-7
	Final Exam	3 hr	50% (50)	16	LO # All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Plant layout: - Define organization structures & types, Productivity, basic concepts, classification, measurement and improvement.
Week 2	Define plant layout, Describe the objective and principles of plant layout.
Week 3	Explain Process Layout, Product Layout and Combination Layout
Week 4	Operations Research: - Introduction to Operations Research and its applications,
Week 5	Define Linear Programming Problem, Solution of L.P.P. by graphical method ,
Week 6	Evaluation of Project completion time by Critical Path Method and PERT (Simple problems)- Explain distinct features of PERT with respect to CPM.
Week 7	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit
Week 8	Sinusoidal Forcing, Complex Forcing, Phasors, and Complex Impedance, Sinusoidal Steady State Response
Week 9	Inventory Control: - Classification of inventory. Objective of inventory control. Describe the functions of inventories. .
Week 10	Explain and Derive economic order quantity for Basic model. (Solve numerical) . Define and Explain ABC analysis.
Week 11	Plant maintenance: - Describe the objectives of plant maintenance. Describe the duties, functions and responsibilities of plant maintenance department.
Week 12	Describe the types of maintenance: Preventive, Breakdown, Scheduled and Predictive maintenance
Week 13	Inspection and Quality Control: Define Inspection and Quality control. Describe planning of inspection. Describe types of inspection. Study of factors influencing the quality of manufacture
Week 14	Explain the Concept of statistical quality control, Control charts (X, R, P and C - charts). Solve related problems.

Week 15	Contemporary Quality Management Concepts Concept of total quality management (TQM) 8.2 ISO-9000/14000, concept & its evolution & implications. JIT, Six Sigma, 7S, Lean manufacturing [8 hrs]
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	O.P.Khanna Industrial Engineering & Management Dhanpat Rai & Sons	no
Recommended Texts	• Telsang Industrial Engg& Production Management S. Chand • M.Mahajan Statistical Quality Control Dhanpat Rai & Sons	No
Websites		

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Member Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

1- Design of Machine Elements-I

Module Information معلومات المادة الدراسية					
Module Title	Design of Machine Elements-I			**Module Delivery**	
Module Type	C			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	MEC 023				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	**UGIV**		**Semester of Delivery**	**7**	
Administering Department	**MEC**		**College**	**ENG**	
Module Leader	**Arz Y. Qwam Alden**		**e-mail**	arzrzayeg@uoanbar.edu.iq	
Module Leader's Acad. Title	**Assist. Prof.**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	**Arz Y. Qwam Alden**		**e-mail**	arzrzayeg@uoanbar.edu.iq	
Peer Reviewer Name	Dr. MazinYaseenAbbood		**e-mail**	mazin76eng@uoanbar.edu.iq	
Scientific Committee Approval Date	1/6/2023		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	(MEC 010) Strength of Materials II	**Semester**	Four
Co-requisites module	None	**Semester**	

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

Module Aims أهداف المادة الدراسية	1. To cover the basics of machine design, including the design process, engineering mechanics and materials, failure prevention under static and variable loading, and characteristics of the principal types of mechanical elements 2. To offer a practical approach to the subject through a wide range of real-world applications and examples 3. To encourage students to link design and analysis 4. To encourage students to link fundamental concepts with practical component specification. 5. To illustrate to students the variety of mechanical components available and emphasize the need to continue learning.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply stress analysis theory and appropriate criteria of failure to the design of simple machine elements 2. Design shafts for static and variable stresses and estimate stress concentration. 3. Design of Screws, Fasteners, and the Design of Nonpermanent Joints. 4. Design of welding, bonding and other permanent joints.
Indicative Contents المحتويات الإرشادية	Machine Design or Mechanical Design can be defined as the process by which resources or energy is converted into useful mechanical forms, or mechanisms so as to obtain useful output from the machines in the desired form as per the needs of the human beings. Machine design can lead to the formation of an entirely new machine or can lead to up-gradation or improvement of the existing machine. This course covers basic criteria of the performance and design of machine parts, determination of permissible and actual stresses. The first part of the course deals with the analysis and design of parts subjected to static loading, variable loading, and how to proportion them to successfully resist such conditions. The second part provides a classical treatment on the design of machine elements such as shafts, screws, fasteners, welding, and bonding by presenting established design methodologies as set by the appropriate organizations.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary 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 types of simple examples involving some homework activities for the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.133
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	4,8,12	LO #1,2,3,4
	Assignments (HW)	**2**	**5% (5)**	6,9,14	LO #3,4
	Report	**1**	**5% (5)**		
	Activities	1	**5% (5)**		
	Lab				
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	7	LO #1,2,3,4
	Final Exam	**3 hr**	**50% (50)**	16	LO #1,2,3,4
Total assessment			100% (100)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamentals of mechanical engineering design
Week 2	Failures Resulting from Static Loading
Week 3	Failures Resulting from Static Loading
Week 4	Failures Resulting from Static Loading
Week 5	Fatigue Failure Resulting from Variable Loading
Week 6	Fatigue Failure Resulting from Variable Loading
Week 7	Fatigue Failure Resulting from Variable Loading
Week 8	Shafts and Shaft Components

Week 9	Shafts and Shaft Components
Week 10	Screws, Fasteners, and the Design of Nonpermanent Joints
Week 11	Screws, Fasteners, and the Design of Nonpermanent Joints
Week 12	Screws, Fasteners, and the Design of Nonpermanent Joints
Week 13	Welding, Bonding, and the Design of Permanent Joints
Week 14	Welding, Bonding, and the Design of Permanent Joints
Week 15	Welding, Bonding, and the Design of Permanent Joints
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Mechanical Engineering Design by Shigley, 9th Edition, 2011	Yes
Recommended Texts	Mechanical Engineering Design by Shigley, 10th Edition, 2015 Mechanical Engineering Design by Shigley, 11th Edition, 2020 Machine Design By Khurmi, Fourteenth Edition, 2005	No
Websites	https://www.uoanbar.edu.iq/English/staff-page.php?ID=739	

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

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

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

Module Approval

المصادقة على وصف المادة الدراسية

	Name	Date	Signature
Module Leader Approval		**8/6/2023**	
Peer Reviewer Approval		**8/6/2023**	
Scientific Committee Members Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific Committee Head Approval		**8/6/2023**	

2- Air conditioning

Module Information
معلومات المادة الدراسية

Module Title	**Air conditioning**		**Module Delivery**	
Module Type	**C**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC 024**			
ECTS Credits	6			
SWL (hr/sem)	**150**			
Module Level	UGIV	**Semester of Delivery**	7	
Administering Department	MEC	**College**	ENG	
Module Leader	Abdulrahman Homadi	**e-mail**	abd.mohammed@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Abdulrahman Homadi	**e-mail**	abd.mohammed@uoanbar.edu.iq	
Peer Reviewer Name	Dr. ObaidTalakFadhil	**e-mail**	obaid_fadhil@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MEC 018 Heat Transfer-II	**Semester**	6
Co-requisites module	None	**Semester**	

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

Module Aims أهداف المادة الدراسية	1. Explain the properties of moist air and how to calculate each property. 2. Use the psychrometric chart to find the properties of the moist air, as well as the representation of air conditioning processes. 3. Encourage students to link with the procedure of simplified estimations of the

	heating and cooling loads. 4. Cover the types of air conditioning systems. 5. Illustrate to students of the methods used to calculate the sizes of air ducts, as well as the overall pressure drop in air ducts system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the moist air properties and their calculations 2. Apply the basic concepts of thermodynamics and the psychrometric chart to evaluate the moist air properties and analysis the air conditioning processes. 3. Analyze the thermal comfort conditions 4. Evaluate the heating and cooling loads of a building 5. Identify the appropriate indoor and outdoor design conditions of certain applications. 6. Compare the various types of air conditioning systems 7. Design the air ducts and identify the total pressure drop for the ducting system
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Circuit Theory Introduction to air conditioning, scope of air conditioning, some definitions that related to air conditioning, [12hrs] Properties of moist air, some definitions, Dalton's law, ideal gas law, [12hrs] Psychrometry of air-conditioning processes, psychrometric chart, psychrometric processes, sensible heating and cooling, cooling with dehumidification, Heating with humidification, By-pass factor of heating and cooling coil, [30 hrs] Thermal comfort, Heat balance equation, thermal interchange with environment, environment parameter and indices environmental parameters, Environmental indices, comfort chart, Prediction of thermal comfort, indoor design conditions, quality and quantity of air, outside design conditions [12 hrs] Heating load calculations. Heat transfer, Heat transfer modes, overall heat transfer coefficient, wall surface temperature, [18 hrs] Cooling load calculation, heat flow term, cooling load, heat gain, space heat extraction rate, cooling coil load, components of cooling load, sensible heat gain, latent heat gain, Design conditions, indoor design conditions, outdoor design conditions, calculation of cooling load, heat gain through external wall and roofs, heat gain through glass, heat gain from adjacent unconditioned spaces, heat gain due to infiltration, heat gain due to ventilation, heat gain from occupants, heat gain from appliances, heat gain due to processes, Heat gain from lighting equipment, heat gain from power equipment, Heat gain through ducts. [30 hrs] Air conditioning systems and equipment, introduction, classification of air conditioning systems, based on the fluid used, based on number of zones, unitary systems, window air conditioner, split air conditioner, central air conditioning systems, multiple zone systems, reheat system, multizone system, dual duct system, variable air volume system, all water system, air conditioning equipment,

	cooling coil, heating coil, air cleaning device, humidifiers, fan, [24hrs] Air distribution systems and duct design, classification of ducts, duct material, duct shape, pressure in ducts, continuity equation for ducts, evalution od dynamic pressure loss through turns, bends or elbows, various fittings, Duct design, equal pressure drop method, velocity method, equal friction, [12 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The most important strategies that will be adopted in delivering this module are: - Allow students to actively participate in the learning process with class discussions and exercises that support the initiative. - Incorporate flexible seating into my classroom - Knowledge application and Extended critical thinking - **Do Summative assessments** Occurs at end of chapter - **Do** Formative Assessment occurs through chapter to Covers complete content areas - Case-Based Learning.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	3, 12	LO #1, 2, 3,4,5,6 and 7
	Assignments (HW)	**2**	**5% (5)**	2, 12	LO # 2, 3, 4,5,6 and 7

	Report			Continuous	
	Activities	1	**4% (4)**		
	Lab	4	**6% (6)**	13	LO # 5, 6 and 7
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	7	LO # 1-7
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to air conditioning
Week 2	Moist air properties
Week 3	Moist air properties
Week 4	Psychrometric chart and psychrometry processes
Week 5	Psychrometric chart and psychrometry processes
Week 6	Thermal comfort
Week 7	Indoor and outdoor design conditions
Week 8	Mid Term Exam
Week 9	Heating load calculation
Week 10	Heating load calculation
Week 11	Cooling load calculation
Week 12	Cooling load calculation
Week 13	Air conditioning systems
Week 14	Air conditioning systems , Air distribution systems and duct design
Week 15	Air distribution systems and duct design
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Cooling & dehumidification process.

Week 2	Lab 1: Cooling & dehumidification process.
Week 3	Lab 1: Cooling & dehumidification process.
Week 4	Lab 2: Heating & humidification process
Week 5	Lab 2: Heating & humidification process
Week 6	Lab 2: Heating & humidification process
Week 7	.
Week 8	Lab 3: Central air conditioning system.
Week9	Lab 3: Central air conditioning system.
Week 10	Lab 3: Central air conditioning system
Week 11	Lab4: Cooling tower performance.
Week 12	Lab4: Cooling tower performance.
Week 13	Lab4: Cooling tower performance.
Week 14	
Week 15	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Refrigeration and Air Conditioning by AhmadulAmeen.	Yes
Recommended Texts	Refrigeration and Air Conditioning by S.N. Sapali. Refrigeration and Air Conditioning by C.P. Arora.	No
Websites	https://www.uoanbar.edu.iq/EngineeringCollege/CMS.php?ID=15	

Grading Scheme
مخطط الدرجات

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	
Scientific Committee Members Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

3- Mechanical Vibrations

Module Information معلومات المادة الدراسية		
Module Title	**Mechanical Vibrations**	**Module Delivery**
Module Type	**C**	☒Theory ☐Lecture ☒Lab
Module Code	**MEC 025**	
ECTS Credits	**5**	

SWL (hr/sem)	**125**	☒**Tutorial** ☐**Practical** ☐**Seminar**

Module Level	UGIV	**Semester of Delivery**	7
Administering Department	MEC	**College**	ENG
Module Leader	Dr. Khaldoon F. Brethee	**e-mail**	Khaldon77m@uoanbar.edu.iq
Module Leader's Acad. Title	Assist. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr. Khaldoon F. Brethee	**e-mail**	Khaldon77m@uoanbar.edu.iq
Peer Reviewer Name	Dr.Hamad M.Hasan	**e-mail**	hamad.m.hasan@uoanbar.edu.iq
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MEC 019 Theory of Machines-II	**Semester**	6
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The goals of this course are to enable students to: 1. Formulate mathematical models of problems in vibrations using Newton's second law or energy principles. 2. Familiarize the student with the underlying concepts of linear mechanical vibrations through analysis of the free and forced responses of various single degree-of-freedom (SDOF) and multiple degree-of-freedom (MDOF) systems. 3. Determine a complete solution to the modeled mechanical vibration problems. 4. Correlate results from the mathematical model to physical characteristics of the actual system
Module Learning Outcomes	1. Derive the equations of motion for single degree of freedom (SDOF) and multi-degree of freedom systems (MDOF).

مخرجات التعلم للمادة الدراسية	2. Understand the goal of damping systems in mechanical vibrating systems. 3. Model, calculate and interpret the response of vibrating of single degree of freedom (SDOF) and multi-degree of freedom systems (MDOF). 4. Analyse the vibratory behaviour of different mechanical vibration systems subjected to harmonic force or impulsive force. 5. Design model systems that minimize the transmission of vibration to mechanical or structural systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Fundamentals of Vibration** Concepts of Vibration Modeling Vibration Mass/ Inertia Element Spring Elements Combination of Springs Equivalent Spring Constants of Common Structural Elements Harmonic Motion Revision problem classes [4 hrs] **Free Vibration of Undamped Systems** Vibration Analysis Number of Degrees of Freedom (DOF) Single Degree of Freedom Solve Equation of Motion Using Newton s Second Law of Motion Spring-mass system Energy Method Rayleigh Method: Effective Mass Revision problem classes [4 hrs] **Free Vibration of Damped Systems** Damping Element Equation of Motion Critical Damping Constant and the Damping Ratio. Logarithmic Decrement Revision problem classes [4 hrs] **Forced Harmonic Vibration** Harmonie Excitation of an Undamped System Under Harmonic Force Harmonie Excitation of a Damped System Under Harmonic Force Magnification Factor Response of Damped System Under F(t) = F0 eiωt Frequency Response: Base Excitation Response of a Damped System Under Rotating Unbalance Forced Vibration with Coulomb Damping Forced Vibration with Hysteresis Damping

	Vibration Isolation Vibration-Measuring Instruments Revision problem classes [4 hrs] Free Vibrations of Multi-Degree-of- Freedom Systems Two-Degree-of- Freedom Systems Equations of Motion for Forced Vibration Finding Natural Frequencies and modes Coordinate Coupling Multi-Degree-of-Freedom Systems Revision problem classes [4 hrs]

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. Also, encourage students to learn various methods for analyzing the dynamic response of various mechanical systems. 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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	**5**	**25% (25)**	3, 5, 10	LO #1, 2, 3 and 4
	Assignments (HW)	**2**	**5% (5)**	2, 8, 12	LO # 1, 2, 3 and 5
	Report			1-12	LO #1, 2 and 3

	Activities		**4% (4)**		
	Lab		**6% (6)**	-	-
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	7	LO # 1, 2 and 3
	Final Exam	**3 hr**	**50% (50)**	16	LO #1, 2, 3, 4 and 5
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Fundamentals of Vibration** Concepts of Vibration
Week 2	**Fundamentals of Vibration** Harmonic Motion
Week 3	**Free Vibration of Undamped Systems** Vibration Analysis/Number of Degrees of Freedom (DOF)
Week 4	Free vibration of undamped SDOF systems - Energy Method
Week 5	Free vibration of undamped SDOF systems -Rayleigh Method: Effective Mass
Week 6	**Free Vibration of Damped Systems-** Damping Element Equation of Motion Critical Damping Constant and the Damping Ratio. Logarithmic Decrement
Week 7	**Free Vibration of Damped Systems-** Critical Damping Constant and the Damping Ratio. Logarithmic Decrement
Week 8	**Free Vibration of Damped Systems-** Logarithmic Decrement
Week 9	**Forced Harmonic Vibration** Harmonie Excitation of an Undamped System Under Harmonic Force
Week 10	**Forced Harmonic Vibration** Harmonie Excitation of a Damped System Under Harmonic Force Magnification Factor
Week 11	**Forced Harmonic Vibration** Response of Damped System Under F(t) = F0 eiωt Frequency Response Base Excitation
Week 12	Response of a Damped System Under Rotating Unbalance Forced Vibration with Coulomb Damping Forced Vibration with Hysteresis Damping Vibration Isolation Vibration-Measuring Instruments
Week 13	Free Vibrations of Multi-Degree-of- Freedom Systems Two-Degree-of- Freedom Systems
Week 14	Free Vibrations of Multi-Degree-of- Freedom Systems Finding Natural Frequencies and modes
Week 15	Free Vibrations of Multi-Degree-of- Freedom Systems Coordinate Coupling Multi-Degree-of-Freedom Systems
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-3	Determination of Single and Combine Spring Constants
Week 4-6	Dynamically Determination of Single and Combine Spring Constants
Week 7-9	Pendulum Periods and Gravitational Acceleration
Week 10-12	Perform Forced Vibration near Natural Frequency

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Mechanical Vibrations: Theory & Applications by W.T. Thompson.	Yes
Recommended Texts	1. Rao, S. S., & Yap, F. F. (1995). *Mechanical vibrations* (Vol. 4, pp. 75-848). New York: Addison-wesley 2. Thomson, W. T. (2018). *Theory of vibration with applications*. CrC Press.	No
Websites		

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

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

Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	
Scientific Committee Members Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

4- Engineering Materials

Module Information معلومات المادة الدراسية		
Module Title	Engineering Materials	**Module Delivery**
Module Type	C	☒ **Theory**

Module Code	MEC 026			☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGIV		**Semester of Delivery**	Seven	
Administering Department	MEC		**College**	ENG	
Module Leader	Zinah Jumaah Ahmed		**e-mail**	Zinah.j.ahmed@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	Zinah Jumaah Ahmed		**e-mail**	Zinah.j.ahmed@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Kadhum Ahmed Abed		**e-mail**	kadhum1968@uoanbar.edu.iq	
Scientific Committee Approval Date			**Version Number**	1	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MEC 011 Engineering Metallurgy	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1.Understand the practical concepts of engineering materials and their properties and applications. 2. Apply the knowledge of material properties and material selection foundations that are related to mechanical Engineering program.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1 Obtain important information of the mechanical properties of materials. 2. Classified the materials. 3. Select the optimal material for each application. 4. Analyze any type of failure and find the reasons of failure. 5. know the developments of new materials.
Indicative Contents	Properties of materials (Mechanical tensile properties, fatigue cyclic stresses, stress

المحتويات الإرشادية	life behavior, S-N curves. Factor affecting fatigue life, safe-life predication. Creep test, classification of materials (ferrous and nonferrous metals, properties, classification). Polymer structures, hydrocarbon molecules, thermoplastic and thermosetting. Stress-strain behavior. plastic, fibers, ceramic structure and properties, silicate ceramics, glasses and glass ceramic, clay products, cements, advanced ceramics. Composites materials, fiber composite, large-particle composites, dispersions strengthened composite, matrix phase, polymer-matrix composites, materials selection Materials Selection Methodology, Ranking the materials by their ability to meet the objectives.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Engineering Materials is compulsory course which is offered to 4th year for Mechanical Engineering Department students and equips students to study the properties of engineering materials well as the limits of their use and the classification of these materials according to their structure. Also, the selecting methods of engineering materials for each application are investigated. The course material is presented in a series of online or face-to-face lectures and/or videos of the manufacturing processes. Students are expected to conduct a significant amount of self-directed learning for this module. The core teaching material is supplemented by weekly tutorial sessions. With a strong emphasis on understanding all engineering material properties and the main features that could be used for select a suitable material in different industry fields and their application and other factors related to them. As well as applying their knowledge to current research projects within the School of Engineering.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	Week 3,6,10,12,15	LO #1,2,3,4
	Assignments (HW)	**2**	**5% (5)**		LO #3,4
	Report	**1**	**5% (5)**		
	Activities	1	**5% (5)**		5
Summative assessment	**Lab**			Week 8	
	Midterm Exam	**2 hr**	**10% (10)**	Week 16	LO #1,2,3,4
	Final Exam	**3 hr**	**50% (50)**		LO #1,2,3,4
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Material Properties
Week 2	Mechanical Properties
Week 3	Temperature Effect
Week 4	Physical Properties
Week 5	Fluid Properties
Week 6	Engineering Materials (Ferrous Metal)
Week 7	Engineering Materials (Ferrous Metal)
Week 8	Engineering Materials (Nonferrous Metal)
Week 9	Engineering Materials (Nonferrous Metal)
Week 10	Engineering Materials (Non-metallic)
Week 11	Engineering Materials (Non-metallic)
Week 12	Designation the Engineering Materials
Week 13	Designation the Engineering Materials
Week 14	Selection of Materials

Week 15	Selection of Materials
Week 16	Application

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts	1- Materials and processes in manufacturing, 10th Edition, 2008. J T. Black, R. A. Kohser and E. P. Degarmo, 2- Materials Science and Engineering an Introduction William D. Callister, Jr. 3- Foundations of Materials Science and Engineering, by William F. smith &JavadHashemi	Yes
Websites		

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

(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

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

5- Computational Fluid Dynamics

Module Information معلومات المادة الدراسية		
Module Title	**Computational Fluid Dynamics**	**Module Delivery**
Module Type	E	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	MEC 01E	
ECTS Credits	5	
SWL (hr/sem)	125	

Module Level	UGIV	**Semester of Delivery**	7
Administering Department	MEC	**College**	ENG
Module Leader	SAAD M JALIL	**e-mail**	saad.jalil@uoanbar.edu.iq
Module Leader's Acad. Title	Asst.Prof.	**Module Leader's Qualification**	Ph. D.
Module Tutor	SAAD M JALIL	**e-mail**	saad.jalil@uoanbar.edu.iq
Peer Reviewer Name	Dr. Mohammed Abed	**e-mail**	Mahammed.abed@uoanbar.edu.iq
Scientific Committee Approval Date	1/6/2023	**Version Number**	1

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	(MEC 008) Thermodynamic II, (MEC 015)Engineering Analysis ,(ENG 011)Engineering Numerical Methods	**Semester**	Four, five, six
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The goals of this course are to enable students: 1. To understand the mathematical characteristics of the governing equations for fluid flow and heat transfer. 2. To develop skills in computational fluid dynamics to address engineering problems. 3. To apply Finite difference method in solving different type of Partial Differential Equations (PDEs) that descript different fluid dynamics and heat transfer problems. 4. To learn and practice in using ANSYS FLUENT in design, meshing and solving various CFD applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon the successful completion of this course, students will be able: 1. To understand mathematical characteristics of partial differential equations. 2. To understand basic properties of computational methods. 3. To learn computational solution techniques for various types of partial differential equations. 4. To learn how to use Ansys Fluent as a commercial code for solving problems by numerical methods.
Indicative Contents المحتويات الإرشادية	1.To understand mathematical characteristics of partial differential equations. [25 hrs] 2.To understand basic properties of computational methods. [25 hrs] 3.To learn computational solution techniques for various types of partial differential equations. [25 hrs] 4.To learn how to use Ansys Fluent as a commercial code for solving problems by

	numerical methods. [25 hrs] 5.Revision problem classes [15 hrs]

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	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	6, 13	LO #1-3
	Assignments (HW)	**2**	**5% (5)**	3, 12	LO #2-3
	Report			Continuous	LO #4
	Activities	1	**4% (4)**		
	Lab		**6% (6)**		
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	7	LO #2,4
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment					

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Computational Fluid Dynamics
Week 2	Mathematical Modelling
Week 3	Mathematical Classification of Partial Differential Equations
Week 4	Boundary Conditions
Week 5	NUMERICAL MODLEING AND SIMULATION
Week 6	Discretization Method: Finite Difference Methods.
Week 7	FDM first order and second orders
Week 8	FDM first order and second orders
Week 9	NUMERICAL MODLEING AND SIMULATION
Week 10	NUMERICAL MODLEING AND SIMULATION
Week 11	Accuracy, Consistency, Stability and Convergence.
Week 12	NONLINEAR PROBLEMS
Week 13	NONLINEAR PROBLEMS
Week 14	Irregular shapes
Week 15	Irregular shapes
Week 16	**Final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Hoffmann, K. A. (1989): Computation fluid dynamics for engineers. A publication of engineering education systemTM, Austin, Texas 78713, USA.	
Recommended Texts	Anderson, J. D. Jr. (1995): Computation fluid dynamics, the basic with applications, McGraw-Hill, New York. Boss, T. K. (1997): Numerical fluid dynamics, Narosa Publishing House, New Delhi. Computational Fluid Mechanics and heat transfer, John C. Tannehill et al., 1997.	
Websites		

Grading Scheme
مخطط الدرجات

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

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

Module Approval
المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	

Scientific Committee Members Approval		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		8/6/2023	

6- Final Year Project-I

Module Information معلومات المادة الدراسية					
Module Title	**Final Year Project-I**			**Module Delivery**	
Module Type	C			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	**MEC 027**				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGIV		**Semester of Delivery**	Seven	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Ahmed Ali Najeeb		**e-mail**	Ashaab_1977@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		

Peer Reviewer Name	Dr. Waleed M. Abed	**e-mail**	waleed_eng76@uoanbar.edu.iq
Scientific Committee Approval Date	20/06/2023	**Version Number**	One

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The objectives of the course are as follows: 1. The objective of the Final Year Project is to demonstrate a student's ability to apply the knowledge and skills gained throughout his/her studies to a specific area in any topic in the mechanical engineering department in a methodical and analytical manner. 2. Allow students to enhance their problem-solving and analytical skills. 3. Make students aware of real-life constraints and allow them to critically evaluate alternatives before selecting a final option. 4. Foster teamwork and effective collaboration skills. 5. Enhance students' technical writing and professional communication skills. 6. Developing the ability to critically analyze and evaluate current scientific achievements, generate new ideas when solving research and practical problems. 7. Defining the area of scientific research and analyzing the state of the issue in the subject area under study; developing readiness and basic

	skills for self-formulation and solving problems that arise in the course of research activities and require in-depth professional knowledge. 8. Processing and analysis of the results of theoretical and experimental research, the formation of skills to use modern technologies for collecting information, processing and interpreting the obtained empirical data.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. 2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. 3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. 4. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies. 5. Ability to comprehend professional and ethical responsibilities. 6. An ability to function as a team member and as well as a leader in the project group. 7. The ability to present what has been done in a scientific and practical manner and to answer the examination committee's inquiries convincingly as one team.
Indicative Contents المحتويات الإرشادية	
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time

	refining and expanding their critical thinking skills. This will be achieved through presentation, report, and poster by considering type of theoretical analysis, experiments and numerical simulation.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**dissertation organize**	1	10%	13	1,2,3,4,5,6,7
	Progress Report	1	40%	14	1,2,3,4,5,6,7
Summative assessment	**Final Exam**	1	50%	15	1,2,3,4,5,6,7
		100%			

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

week	Material Covered
1-2	Prepare to final project, familiarization with the goals, objectives and content
3-5	Reports and deadlines for their submission, preparation of a time table and contents of project. Workplace safety briefing. Preparing the workplace of the engineer-researcher.
6-8	Development of the first part of the report - the results of an in-depth analytical review on

	the research topic.
9-10	Identification of the main technical characteristics and metrics for analytical comparison of known solutions and the expected results of the final project.
11-12	Development of requirements for the technical characteristics and composition of laboratory equipment for research.
13-15	Assembling a laboratory demonstrator. Development of a methodology for conducting an experiment. Testing a laboratory setup. Preparation of a scientific article describing the laboratory facility.

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

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

Grading Scheme

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

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

7- Design of Machine Elements-II

Module Information معلومات المادة الدراسية					
Module Title	**Design of Machine Elements-II**			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MEC 028				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	**UGIV**		**Semester of Delivery**		**8**
Administering Department	**MEC**		**College**	**ENG**	
Module Leader	**Arz Y. Qwam Alden**		**e-mail**	**arzrzayeg@uoanbar.edu.iq**	
Module Leader's Acad. Title	**Assist. Prof.**		**Module Leader's Qualification**		**Ph.D.**
Module Tutor	**Arz Y. Qwam Alden**		**e-mail**	**arzrzayeg@uoanbar.edu.iq**	
Peer Reviewer Name	Dr. MazinYaseenAbbood		**e-mail**	mazin76eng@uoanbar.edu.iq	
Scientific Committee Approval Date	1/6/2023		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	(MEC 023) Design of Machine Elements-I	**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce students to the design and theory of common machine elements and to give students experience in solving design problems involving machine elements. 2. To combine forces, moments, torques, stress and strength information to develop ability to analyze, design and/or select machine elements. With attention to safety, reliability, and societal and fiscal aspects. 3. To require the student to prepare professional quality solutions and presentations to effectively communicate the results of analysis and design. 4. To be acquainted with standards, safety, reliability, importance of dimensional parameters and manufacturing aspects in mechanical design.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the fundamentals of the theory of lubrication and journal bearings 2. Design of specific mechanical elements including: gears, gear trains, clutches, coupling, brakes, springs, ropes and chains drives. 3. Recognize the fundamentals of the Rolling-Contact Bearings. 4. Design and evaluation of a machine component that is created to satisfy a specific need. Also, gain an appreciation for and become proficient in applying the final steps of the engineering design process.
Indicative Contents المحتويات الإرشادية	Design of machine elements is defined as the use of imagination, scientific principles and engineering techniques to create elementary components of machine or structure economically, in order to satisfy the industry requirements and then needs of customers. The focus in this course is on blending fundamental development of concepts with practical specification of components so that students find them familiar with both the basis for decisions and the standards of industrial components. Fundamentals of gears are included to address the design of compound gear trains to achieve specified gear ratios. The discussion of the relationship between torque, speed, and power is clarified. Design of rolling bearing introduces the invariant, the statistical distribution of life as well as some useful deterministic

	equations addressing load versus life at constant reliability. The importance of lubrication in reducing friction, wear, and heating of machine parts that move relative to each other is explained. Recent metallurgy developments in bearing materials combined with increased knowledge of the lubrication process give a possibility to design journal bearings with satisfactory lives with very good reliabilities. This course discusses the more frequently used types of springs, their necessary parametric relationships, and their design. Moreover, the course provides a classical treatment on the design of machine elements such as brakes, clutches, and flywheels, and their applications by presenting established design methodologies as set by the appropriate organizations.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary 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 types of simple examples involving some homework activities for the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	4,8,12	LO #1,2,3,4
	Assignments (HW)	**2**	**5% (5)**	6,9,14	LO #3

	Report	**1**	**5% (5)**		
	Activities	1	**5% (5)**		
	Lab				
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	7	LO #1,2
	Final Exam	**3 hr**	**50% (50)**	16	LO #1,2,3,4
Total assessment			100% (100)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Mechanical Springs
Week 2	Mechanical Springs
Week 3	Mechanical Springs
Week 4	Rolling-Contact Bearings
Week 5	Rolling-Contact Bearings
Week 6	Rolling-Contact Bearings
Week 7	Lubrication and Journal Bearings
Week 8	Lubrication and Journal Bearings
Week 9	Lubrication and Journal Bearings
Week 10	Gears-General
Week 11	Gears-General
Week 12	Spur, Helical, Bevel, and Worm Gears
Week 13	Spur, Helical, Bevel, and Worm Gears
Week 14	Clutches, Brakes, Couplings, and Flywheels
Week 15	Clutches, Brakes, Couplings, and Flywheels
Week 16	**Preparatory week before the final Exam**

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

Week 3	
Week 4	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Mechanical Engineering Design by *Shigley*, 9th Edition, 2011	Yes
Recommended Texts	Mechanical Engineering Design by *Shigley*, 10th Edition, 2015 Mechanical Engineering Design by *Shigley*, 11th Edition, 2020 Machine Design By *Khurmi*, Fourteenth Edition, 2005	No
Websites	https://www.uoanbar.edu.iq/English/staff-page.php?ID=739	

Grading Scheme
مخطط الدرجات

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

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

Module Approval
المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	
Scientific Committee Members Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	

		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		8/6/2023	

8- Refrigeration

Module Information معلومات المادة الدراسية					
Module Title	**Refrigeration**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MEC 029**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGIV		**Semester of Delivery**	8	
Administering Department	MEC		**College**	ENG	
Module Leader	AbdulrahmanHomadi		**e-mail**	abd.mohammed@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	AbdulrahmanHomadi		**e-mail**	abd.mohammed@uoanbar.edu.iq	
Peer Reviewer Name	Dr. ObaidTalakFadhil		**e-mail**	obaid_fadhil@uoanbar.edu.iq	
Scientific Committee Approval Date	1/6/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	(MEC 008) Thermodynamics II	**Semester**	4

Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- Understand the parts of the vapour compression cycle, and how to analyze and solve the relevant exercises 2- Have knowledge of the refrigerants, and the most important properties which must be available in them. **3.** Familiarize the students on how the vapour absorption cycles operate, as well as the procedure to analyze and solve the relevant exercises. **4.** Identify the types of air refrigeration cycles, and how to analyze and solve the relevant exercises. **5.** Have knowledge of the thermoelectric, vortex tube, and steam jet water vapour refrigeration systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Analyze the laws of thermodynamics specially reverse Carnot cycle 2. Analysis the performance of the vapour compression cycles and understand the most important properties which must be available in the refrigerants 3. Understanding the multistage vapor compression system 4. Recognize the refrigerants types and their chemical formulas 5. Recognize the components of system 6. Understanding the vapor absorption system and estimate the performance parameters of the lithium bromide-water absorption refrigeration cycles for a certain cooling load. 7. Explain the components and the principle of work of the thermoelectric, vortex tube, and steam jet water vapour refrigeration systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction and basic principles Introduction, history of refrigeration, application of refrigeration, unit, thermodynamics, the zeroth law of thermodynamics, the first law of thermodynamics, the second law of thermodynamics, reversible and irreversible processes, [10hrs] Vapor compression cycle and heat pump, carnot engine, ideal vapor compression refrigeration cycle, Actual vapor compression cycle, Supercooling the liquid and superheating the vapor of refrigerant, Multi-pressure systems, Multistage vapor compression cycle, intercooling, multi-evaporator systems, cascade system, [50 hrs] Refrigerants – introduction, classification of refrigerants, halo-carbon refrigerant, Inorganic refrigerant, hydro-carbon refrigerant, Azeotrope refrigerant, the desired properties of refrigerants, Common refrigerants, Designation system for refrigerants,

	[30hrs] Refrigeration system components, the main components, compressors, some important definitions, [20 hrs] Absorption refrigeration system, simple absorption refrigeration system, Advantages of absorption system over compression system, Lithium bromide absortionrefrigeration system, Aqua ammonia absorption system, solar absorption refrigeration system. [40 hrs] Other refrigeration systems- Introduction, Thermoelectric refrigeration, Thermoelectric refrigerator, Thermodynamic analysis of thermoelectric refrigeration system, Vortex tube refrigeration, [10hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The most important strategies that will be adopted in delivering this module are: - Allow students to actively participate in the learning process with class discussions and exercises that support the initiative. - Incorporate flexible seating into my classroom - Knowledge application and Extended critical thinking - **Do Summative assessments** Occurs at end of chapter - **Do** Formative Assessment occurs through chapter to Covers complete content areas - Case-Based Learning.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

		mber			Outcome
Formative assessment	Quizzes	5	25% (25)	5, 10	LO #1, 2, 3,4,5,6 and 7
	Assignments (HW)	2	5% (5)	2, 12	LO # 2,3, , and 6
	Report			Continuous	
	Activities	1	4% (4)	13	LO # 2,3,4 and 7
	Lab	3	6% (6)		
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction and review of basic principles.
Week 2	Vapour compression cycle and heat pumps.
Week 3	Vapour compression cycle and heat pumps.
Week 4	Refrigerants. + Exam 1
Week 5	Vapour absorption cycle.
Week 6	Vapour absorption cycle.
Week 7	Air refrigeration systems.
Week 8	Mid Term Exam
Week 9	Air refrigeration systems.
Week 10	Thermoelectric refrigeration.
Week 11	Thermoelectric refrigeration.
Week 12	Exam 2
Week 13	Vortex tube refrigeration.
Week 14	Steam jet water vapour refrigeration system.
Week 15	Introduction and review of basic principles.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Illustrative refrigeration unit.
Week 2	Lab 1: Illustrative refrigeration unit.
Week 3	Lab 1: Illustrative refrigeration unit.
Week 4	Lab 2: Mechanical heat pump
Week 5	Lab 2: Mechanical heat pump
Week 6	Lab 2: Mechanical heat pump
Week 7	
Week 8	Lab 3: Thermo-electric refrigeration.
Week 9	Lab 3: Thermo-electric refrigeration.
Week 10	Lab 3: Thermo-electric refrigeration.
Week 11	Lab 4: Electrolux refrigerator.
Week 12	Lab 4: Electrolux refrigerator.
Week 13	Lab 4: Electrolux refrigerator.
Week 14	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Refrigeration and Air Conditioning by AhmadulAmeen.	Yes
Recommended Texts	Refrigeration and Air Conditioning by S.N. Sapali. Refrigeration and Air Conditioning by C.P. Arora.	No
Websites		

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

	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

Module Approval

المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	
Scientific Committee Members Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

9- Measurement and Control Systems

Module Information معلومات المادة الدراسية					
Module Title	**Measurement and Control Systems**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MEC 030**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	8	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Khaldoon F. Brethee		**e-mail**	Khaldon77m@uoanbar.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Dr. Khaldoon F. Brethee		**e-mail**	Khaldon77m@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Ghalib R. Ibrahim		**e-mail**	ghalib.ibrahim@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	(MEC 019) Theory of Machines-II	**Semester**	Six
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	8. Demonstrate an understanding of the fundamentals of (feedback) control systems. 9. Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems. 10. Express and solve system equations in state-variable form (state variable models). 11. Determine the time and frequency-domain responses of first and second-order systems to step and sinusoidal (and to some extent, ramp) inputs. 12. Determine the (absolute) stability of a closed-loop control system. 13. Apply root-locus technique to analyze and design control systems. 14. Analyze the frequency response of various control systems
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	11. Identify open and closed loop control system and formulate mathematical model for physical systems. 12. Interpret and apply block diagram representations of control systems 13. Evaluate the transient response specifications for standard input functions 14. Apply the concept of Routh-Hurwitz criteria for stability test. 15. Use Evans root locus techniques in control design for real world systems and design feedback control systems 16. Analyze the dynamic response of various control systems by using Frequency response methods 17. Learn how to identify various measurement systems, errors of measurement, as well as explain working principles of sensors and transducers.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to automatic control system Representation of control systems • - Mass, spring damper system • - Hydraulic system • - Pneumatic system • - Electrical system • - Thermal system • Servomotor Actuators Revision problem classes [4 hrs] Block diagram reduction • Single-Input-single-Output (SISO) • Two-Input-single-Output • Multi-Input-single-Output (MISO) • Laplace transformation of linear equations

	Transient and steady-state responses • Input functions • Response of First-Order Systems • Response of Second-Order Systems • Specifications of transient response • Steady-state errors of control systems Revision problem classes [4 hrs] Stability of control systems • Routh criterion • Root locus method Revision problem classes Measurement Systems • Instrument Characteristics- Standards, errors and Calibration techniques • Probability and uncertainty of measurement techniques Frequency Response • Polar plot • Bode diagram Revision problem classes

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. Also, encourage students to learn various methods for analyzing the time response, frequency response and stability of the systems. 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	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	25% (25)	5, 10	LO #1, 2, 3, 4, 5 and 6
	Assignments (HW)	2	5% (5)	2, 12	LO # 2, 3, 4, 6 and 7
	Report			2- 14	LO #1, 2, 3, 4, 5, 6 and 7
	Activities	1	4% (4)		
	Lab	3	6% (6)	-	-
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1, 2, 3 and 4
	Final Exam	3 hr	50% (50)	16	LO #1, 2, 3, 4, 5, 6 and 7
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to automatic control system
Week 2	Representation of control systems - Mass, spring damper system
Week 3	Representation of control systems -Hydraulic system, • - Pneumatic system
Week 4	Representation of control systems -Electrical system, - Thermal system, Servomotor Actuators
Week 5	Block diagram reduction - Single-Input-single-Output (SISO)
Week 6	Block diagram reduction: •Two-Input-single-Output
Week 7	Block diagram reduction: •Multi-Input-single-Output (MISO)
Week 8	Laplace transformation of linear equations
Week 9	Transient and steady-state responses- • Input functions
Week 10	Transient and steady-state responses- • Response of First-Order Systems and Second-Order Systems
Week 11	Stability of control systems- • Routh criterion
Week 12	Stability of control systems-• Root locus method
Week 13	Measurement Systems - Instrument Characteristics- Standards, errors and Calibration techniques
Week 14	Frequency Response - • Polar plot
Week 15	Frequency Response -• Bode diagram
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-3	Laplace Transformation and Representation of Multi-Input Signals
Week 4-6	Representation of First- Order System
Week 7-9	Representation of Second- Order System
Week 10-13	Determination of Transient Response Specifications

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Ogata, K. (2010). Modern control engineering (Vol. 5). Upper Saddle River, NJ: Prentice hall.	Yes
Recommended Texts	1. Automatic Control Engineering, First Edition 1961, by Francis H. Raven, McGraw Hill. 3. Modern Control Systems, Twelfth Edition 2011, by Richard C. Dorf and Robert H. Bishop, Prentice Hall.	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Module Approval المصادقةعلى وصف المادة الدراسية			
	Name	**Date**	**Signature**
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	
Scientific Committee Members Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

10- Power Plants

Module Information معلومات المادة الدراسية					
Module Title	**Power Plants**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MEC 031**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	8	
Administering Department	MEC		**College**	ENG	
Module Leader	SAAD M JALIL		**e-mail**	saad.jalil@uoanbar.edu.iq	
Module Leader's Acad. Title	Asst.Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	SAAD M JALIL		**e-mail**	saad.jalil@uoanbar.edu.iq	
Peer Reviewer Name	Dr. ObaidTalakFadhil		**e-mail**	obaid_fadhil@uoanbar.edu.iq	
Scientific Committee Approval Date	1/6/2023		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	(MEC 008)Thermodynamics II	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide an overview on power generation through various methods. 2. To learn the layout of different conventional power plants. 3. To understand the various components, operations, and applications of different types of power plant. 4. To understand the working of diesel and gas turbine power plant 5. To create awareness about cost of electric energy, cost calculation and economics of various power plants.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Apply the basic concepts of thermodynamics to evaluate the efficiency of modern Rankine cycle steam power plants with implementation of superheating, reheating, regeneration.ng, regeneration. 2. Elaborate the steam power plant essential parts and its classification. 3. Identifying the performance of gas turbines and combined cycles with modern enhancing efficiency methods including intercooling, reheating and regeneration. 4. Understanding the essential components and working principles of Diesel power plants along with performing heat balance of the plant. 5. Identifying the variable factors affecting in power generation and the variable load. 6. Utilization of solar energyin the power plants and its components.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following:** • Apply the basic concepts of thermodynamics to evaluate the efficiency of modern Rankine cycle steam power plants with implementation of superheating, reheating, regeneration.ng, regeneration. [15hrs] • Elaborate the steam power plant essential parts and its classification. [10hrs] • Identifying the performance of gas turbines with modern enhancing efficiency methodsincluding intercooling, reheating, and regeneration. [10hrs] • Understanding the essential components and working principles of diesel power plants along with performing heat balance of the plant. [10 hrs] • Ability to identify the basic principles of thermal-fission and fast-breeder nuclear power plants, such as pressurized-water, boiling-water, and heavy-water reactors. [10hrs] • Identifying the variable factors affecting in power generation and the variable load. [10hrs] • Utilization of solar energyin the power plants and its components [10hrs]

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. Also, through project assignments to involve the students in various power plants applications and techniques.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	3, 5, 12	LO #1 and 2, 3, 4 and 5
	Assignments (HW)	**2**	**5% (5)**	2, 12	LO # 1, 4, 6
	Report	**1**	**5% (5)**	Continuous	Any LO
	Activities		**5% (5)**		
	Lab				
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	7	LO # 1-3
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction of thermodynamic cycles used in steam power plants
Week 2	Advanced Rankine Cycle (Reheating, Regenerative)
Week 3	Advanced Rankine Cycle (Reheating, Regenerative)
Week 4	steam generators, steam condensers
Week 5	Steam turbines
Week 6	Introduction to gas turbine power plants
Week 7	modification of the basic cycle (intercooling & reheating)
Week 8	modification of the basic cycle (Regeneration)
Week 9	Introduction to Diesel Power Plant
Week 10	Cooling, lubricating, supercharging of Diesel Power Plant
Week 11	Diesel engine performance and operation
Week 12	Economics of Power Plants
Week 13	Cost analysis of a power plant
Week 14	Solar power plant components
Week 15	Solar radiation calculation
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Power Plant Technology by M. M. El Wakil	No

Recommended Texts	Power plant by F.T. Morse Power Plant Engineering by R. K. Hegde Applied Thermodynamics for Engineering Technologist by T. D.Eastop& J Mc. Conkey	No
Websites		

Grading Scheme
مخطط الدرجات

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

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

Module Approval
المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	
Scientific Committee Members Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

11- Finite Element Method

Module Information معلومات المادة الدراسية					
Module Title	**Finite Element Method**			**Module Delivery**	
Module Type	**E**			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MEC 02E**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGIV		**Semester of Delivery**	8	
Administering Department	MEC		**College**	ENG	
Module Leader	Hamad M Hasan		**e-mail**	hamad.m.hasan@uoanbar.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Hamad M Hasan		**e-mail**	hamad.m.hasan@uoanbar.edu.iq	
Peer Reviewer Name	Dr. Ghalib R. Ibrahim		**e-mail**	ghalib.ibrahim@uoanbar.edu.iq	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	(MEC 010) Strength of Materials-II, (MEC 015) Engineering Analysis	**Semester**	Four, five
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. The basic concepts of Finite Element methods and its applications to complex engineering problems. 2. The characteristics and selection of different finite elements used in finite element methods. 3. The equilibrium equations and stress-strain relations for different boundary conditions encountered in structural and heat transfer continuum problems. 4. The application of the FEM technique to dynamic problems and validate the solutions through simulation software for real time applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the shape function concepts of one- and two-dimensional elements for enriching knowledge on stiffness matrix and load vector. 2. Apply numerical methods on one dimensional bar elements for obtaining displacements, stresses, strains, and reaction forces. 3. Make use of shape functions of two degrees of freedom two nodded truss and beam elements for obtaining stiffness matrix and load vector. 4. Demonstrate the physical models of truss and beam elements by applying finite element method for displacements, stresses, and strains. 5. Utilize the concepts of shape functions for developing stiffness matrix of triangular, axisymmetric and four nodded elements.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Background, history [2 hrs.] • Application of the direct stiffness method for tissues beams and frames [10 hrs.] • Meshing and post processing considerations, mesh convergency considerations [20 hrs.] • Problems and errors associated with applying FEM to the solution of actual problems [15 hrs.] • Revision problem classes [6 hrs.]

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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**5**	**25% (25)**	5, 10	LO #1, 2, 4 and 5
	Assignments (HW)	**2**	**5% (5)**		
	Report	**1**	**5% (5)**		
	Activities	1	**5% (5)**		
	Lab			2, 12	LO # 2, 3, 4 and 5
Summative assessment	**Midterm Exam**	**2 hr**	**10% (10)**	7	LO # 1-3
	Final Exam	**3 hr**	**50% (50)**	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to finite element analysis
Week 2	Bar Element
Week 3	Beam Element
Week 4	Linear static analysis
Week 5	Two-Dimensional Analysis
Week 6	Finite element for two-dimensional problems
Week 7	Development of Truss Equations

Week 8	Development of Frame and Grid Equations
Week 9	Development of the Plane Stress and Plane Strain Stiffness Equations
Week 10	Isoperimetric Formulation
Week 11	Numerical Quadrature, Three-Dimensional Stress Analysis
Week 12	Finite Element Modelling and Solution Techniques
Week 13	Plate Elements
Week 14	Solid Elements for 3-D Elements
Week 15	Thermal Analysis
Week 16	**The final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Olek C Zienkiewicz, Robert L Taylor, J.Z. Zhu, The Finite Element Method: Its Basis and Fundamentals, Sixth Edition, Butterworth-Heinemann 2005	Yes
Recommended Texts	Finite Element Analysis Using MATLAB® and Abaqus. Amar Khennane	No
Websites	https://www.wiley.com/en-us/Introduction+to+Finite+Element+Analysis+and+Design%2C+2nd+Edition-p-9781119078739	

Grading Scheme
مخطط الدرجات

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

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

Module Approval

المصادقةعلى وصف المادة الدراسية

	Name	Date	Signature
Module LeaderApproval		**8/6/2023**	
Peer Reviewer Name		**8/6/2023**	
Scientific Committee Members Approval		**8/6/2023**	
		8/6/2023	
		8/6/2023	
		8/6/2023	
		8/6/2023	
Scientific CommitteeHeadApproval		**8/6/2023**	

12- Final Year Project-II

Module Information معلومات المادة الدراسية					
Module Title	**Final Year Project-II**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MEC 032**				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGIV		**Semester of Delivery**	Eight	
Administering Department	MEC		**College**	ENG	
Module Leader	Dr. Ahmed Ali Najeeb		**e-mail**	Ashaab_1977@uoanbar.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name	Dr. Waleed M. Abed		**e-mail**	waleed_eng76@uoanbar.edu.iq	
Scientific Committee Approval Date	1/06/2023		**Version Number**	One	

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

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

Module Aims أهداف المادة الدراسية	1. The objective of the Final Year Project is to demonstrate a student's ability to apply the knowledge and skills gained throughout his/her studies to a specific area in any topic in the mechanical engineering department in a methodical and analytical manner. 2. Allow students to enhance their problem-solving and analytical skills. 3. Make students aware of real-life constraints and allow them to critically evaluate alternatives before selecting a final option 4. Foster teamwork and effective collaboration skills 5. Enhance students' technical writing and professional communication skills 6. Developing the ability to critically analyze and evaluate current scientific achievements, generate new ideas when solving research and practical problems 7. Defining the area of scientific research and analyzing the state of the issue in the subject area under study; developing readiness and basic skills for self-formulation and solving problems that arise in the course of research activities and require in-depth professional knowledge. 8. Processing and analysis of the results of theoretical and experimental research, the formation of skills to use modern technologies for collecting information, processing and interpreting the obtained empirical data
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. 2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. 3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw

	conclusions. 4. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies. 5. Ability to comprehend professional and ethical responsibilities. 6. An ability to function as a team member and as well as a leader in the project group. 7. The ability to present what has been done in a scientific and practical manner and to answer the examination committee's inquiries convincingly as one team.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through presentation, report, and poster by considering type of theoretical analysis, experiments and numerical simulation.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

		mber			Outcome
Formative assessment	**Poster**	1	10%	13	1,2,3,4,5,6,7
	Progress Report	1	40%	14	1,2,3,4,5,6,7
Summative assessment	**Final Exam**	1	50%	15	1,2,3,4,5,6,7
Total assessment			100		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
1-5	Experiments, accumulation and analysis of the results.
6-7	Processing of the data obtained for the preparation of an analytical review.
8-10	Development of the final chapter of the thesis. Preparation of the results of practical implementation for patenting. Registration of accompanying documents for transfer to the intellectual property agency
11-13	Processing and interpretation of research results. Presentation and publication of the results in the form of theses, articles, presentation at the theoretical seminar of the profile Department.
14-15	Scientific interpretation of the data obtained, their generalization, analysis of the research work done, design of theoretical and empirical materials in the form of a report on final project.

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

Week 7	

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

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