جامعة ميسان

مستوى البكالوريوس (الدورة الأولى) - بكالوريوس مع مرتبة الشرف في الهندسة الميكانيكية

أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة اوربية - كل وحدة اوربية = ٢٥ ساعة

المنهاج الدراسي للعام ٢٠٢٣ - ٢٠٢٤

University of Misan

Bachelor's level (First cycle) - Honors Bachelor degree in Mechanical Engineering

Four years (Eight semesters) - 240 ECTS credits - 1 ECTS = 25hr

Program Curriculum (2023 - 2024)

Prerequisite Module(s)	Module Type	ECTS	SWL hr/sem	USSWL hr/sem	SSWL hr/sem	Exam hr/sem	SSWL (hr/w) Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)	Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
	B	5	125	62	63	3		1				3	English	الرياضيات I	Mathematics I	E111	1		UGI
	C	5	125	47	78	3		1				4	English	الميكانيك الهندسي السكوني	Static Engineering Mechanics	ME112	2		
	C	6	150	57	93	3			2			4	English	مبادئ هندسة الانتاج	Principles of Production Engineering	ME113	3		
	S	3	75	42	33	3						2	English	الكيمياء	Chemistry	E114	4	One	
	B	7	175	82	93	3			4			2	English	الرسم الهندسي	Engineering Drawings	E115	5		
	B	4	100	37	63	3						4	English	اللغة الانكليزية	English Language	U116	6		
		30	750	327	423	18		2	6			19	Total						

Prerequisite Module(s)	Module Type	ECTS	SWL hr/sem	USSWL hr/sem	SSWL hr/sem	Exam hr/sem	SSWL (hr/w) Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w	CL (hr/w)	Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
	B	5	125	62	63	3		1				3	English	الرياضيات II	Mathmatics II	E121	1		
	C	5	125	62	63	3		1				3	English	الميكانيك الهندسي الحركي	Dynamic Engineering Mechanics	ME122	2		
	B	3	75	27	48	3			3				English	الورش الهندسية	Engineering Workshops	ME123	3		
	S	3	75	42	33	3						2	English	الفيزياء	Physics	E124	4	Two	
	S	7	175	52	123	3		2		2		4	English	الهندسة الكهربائية	Electrical Engineering	ME125	5		
	B	7	175	52	123	3				4		4	English	اساسيات الحاسوب والبرمجة	Principles of Computer Science and Programming	U126	6		
		30	750	297	453	18		4	3	2		16	Total						

Prerequisite Module(s)	Module Type	ECTS	SWL hr/sem	USSWL hr/sem	SSWL hr/sem	Exam hr/sem	SSWL (hr/w) Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w	CL (hr/w)	Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
	B	5	125	62	63	3		1				3	English	الرياضيات الهندسية I	Engineering Mathmatics I	E211	1		UG2
	C	4	100	52	48	3		1				2	English	ميكانيك الموائع الساكنة	Fluid Statics	ME212	2		
	C	4	100	52	48	3		1				2	English	ديناميك الحرارة I	Thermodynamics I	ME213	3		
	C	5	125	47	78	3		1		2		2	English	ميكانيك المواد	Mechanics of Materials	ME214	4	One	
	C	6	150	57	93	3			4			2	English	الرسم الميكانيكي	Mechanical Drawing	ME215	5		
	B	6	150	42	108	3				3		4	English	برمجة الحاسبات	Programming of Computers	ME216	6		
		30	750	312	438	18		4	4	5		15	Total						

Prerequisite Module(s)	Module Type	ECTS	SWL hr/sem	USSWL hr/sem	SSWL hr/sem	Exam hr/sem	SSWL (hr/w) Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w	CL (hr/w)	Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
	B	5	125	62	63	3		1				3	English	الرياضيات الهندسية II	Engineering Mathmatics II	E221	1		
	C	6	150	57	93	3		1		3		2	English	ميكانيك الموائع المتحركة	Fluid Dynamics	ME222	2		
	C	6	150	57	93	3		1		3		2	English	ديناميك الحرارة II	Thermodynamics II	ME223	3		
	C	4	100	52	48	3		1				2	English	مقاومة المواد	Strenght of Materials	ME224	4	Two	
	C	7	175	67	108	3				3		4	English	المعادن الهندسية	Engineering Metallurgy	ME225	5		
	S	2	50	17	33	3						2	Arabic	الديمقراطية وحقوق الانسان	Democracy and Human Rights	U226	6		
		30	750	312	438	18		4		9		15	Total						

Prerequisite Module(s)	Module Type	ECTS	SWL hr/sem	USSWL hr/sem	SSWL hr/sem	Exam hr/sem	SSWL (hr/w) Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)	Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
	B	5	125	62	63	3		1				3	English	التحليلات الهندسية	Engineering Analysis	E311	1		UG3
	C	4	100	52	48	3		1				2	English	انتقال الحرارة I	Heat Transfer I	ME312	2		
	C	5	125	32	93	3		1		3		2	English	نظرية الالات	Theory of Mechanism	ME313	3		
	C	5	125	32	93	3		1		3		2	English	محركات الاحتراق الداخلي I	Internal Combustion Engines I	ME314	4	One	
	C	4	100	52	48	3		1				2	English	ديناميك الغازات	Gas Dynamics	ME315	5		
	C	7	175	67	108	3				3		4	English	عمليات التصنيع	Manufacturing Process	ME316	6		
		30	750	297	453	18		5		9		15	Total						

Prerequisite Module(s)	Module Type	ECTS	SWL hr/sem	USSWL hr/sem	SSWL hr/sem	Exam hr/sem	SSWL (hr/w) Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w	CL (hr/w)	Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
	B	5	125	47	78	3		1		2		2	English	التحليلات العددية	Numerical Analysis	E321	1		
	C	6	150	57	93	3		1		3		2	English	انتقال الحرارة II	Heat Transfer II	ME322	2		
	C	3	75	27	48	3		1				2	English	نظرية المكائن	Theory of Machines	ME323	3		
	C	3	75	27	48	3		1				2	English	محركات الاحتراق الداخلي II	Internal Combustion Engines II	ME324	4	Two	
	C	6	150	57	93	3		1		3		2	English	المكائن التوربينية	Turbo Machinery	ME325	5		
	S	7	175	67	108	3		1		2		4	English	المكائن الكهربائية	Electrical Machines	ME326	6		
		30	750	282	468	18		6		10		14	Total						

Prerequisite Module(s)	Module Type	ECTS	SWL hr/sem	USSWL hr/sem	SSWL hr/sem	Exam hr/sem	SSWL (hr/w) Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w)	CL (hr/w)	Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
	C	7	175	67	108	3		1		3		3	English	تصميم اجزاء المكائن I	Design of Machine Elements I	ME411	1		UG4
	C	8	200	77	123	3		1		3		4	English	محطات القدرة	Power Plant	ME412	2		
	C	3	75	27	48	3		1				2	English	نظري الاهتزازات	Theory of Vibrations	ME413	3		
	C	3	75	27	48	3		1				2	English	السيطرة	Control	ME414	4	One	
	C	5	125	62	63	3						4	English	المواد الهندسية	Engineering Materials	ME415	3		
	S	4	100	22	78	3			3			2	English	المشروع الهندسي	Engineering Project	ME416	6		
		30	750	282	468	18		4	3	6		17	Total						

Prerequisite Module(s)	Module Type	ECTS	SWL hr/sem	USSWL hr/sem	SSWL hr/sem	Exam hr/sem	SSWL (hr/w) Semn (hr/w)	Tut (hr/w)	Pr (hr/w)	Lab (hr/w)	Lect (hr/w	CL (hr/w)	Language	اسم المادة الدراسية	Module Name in English	Module Code	No.	Semester	Level
	C	5	125	62	63	3		1				3	English	تصميم اجزاء المكائن II	Design of Machine Elements II	ME421	1		
	C	7	175	52	123	3		1		3		4	English	تكييف وتبريد الهواء	Air Conditioning and Refrigeration	ME422	3		
	C	5	125	32	93	3		1	3			2	English	تطبيقات الاهتزاز	Vibration Applications	ME423	3		
	C	5	125	47	78	3		1		2		2	English	القياسات	Measurements	ME424	4	Two	
	S	5	125	62	63	3						4	English	الهندسة الصناعية	Industrial Engineering	ME425	5		
	S	3	75	27	48	3			3				English	المشروع الهندسي	Engineering Project (contnued)	ME416	6		
		30	750	282	468	18		4	6	5		15	Total						

Note: The student should complete 4 weeks of Summer Internships to fullfil the requirements of the Bachelor of Science degree

			Student Workload			SWL:			Basic learning activities		B	Module type		Class Lecture		CL	Structured SWL (hr/w) type		
			Structured SWL			SSWL:			Core learning activity		C			Laboratory		Lab			
			Unstructured SWL			USSWL:			Suport or related learning activity		S			Practical Training		Pr			
									Elective learning activity		E			Tutorial		Tut			
														Online lecture Seminar		Lect			

University of Misan

جامعة ميسان

Bachelor's degree (B.Sc.) in Mechanical Engineering

بكالوريوس في الهندسة الميكانيكية

Table of Contents |جدول المحتويات

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1. Mission & Vision Statement

Vision Statement

The Department of Mechanical Engineering, as a leading academic institution in the field of science, knowledge and community service, looks forward to this institution, and its graduates being among the pioneers of the progress and prosperity of our country by providing engineering programs and services to the community in accordance with international standards of comprehensive quality.

Mission Statement

The Department of Mechanical Engineering seeks to prepare successful engineering cadres armed with science and values to advance the scientific and cognitive reality of society and develop it according to a renewed and distinguished scientific academic system, and to provide it with a generation of conscious and empowered youth in modern concepts and skills with inspiration from the civilizational and Islamic heritage of Iraq.

2. Program Specification

Programme code:	BSc-Mechanical Engineering	**ECTS**	240
Duration:	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

Mechanical engineering science is a wonderfully wide-ranging subject. The focus of the program is on everything related to the mechanical engineering, whether it is power or applied mechanics. The degree is popular or some it is the breadth of the subject that appeals, for others it is a path to specialization. All students have the opportunity to transfer onto our specialist degrees in mechanical engineering at the end of the first year.

Level 1 exposes students to the fundamentals of mechanical engineering, suitable for progression to all programs within the mechanical engineering program group. Program-specific core topics are covered at Level 2 preparing for research-led subject specialist modules at Levels 3 and 4. A Leeds mechanical engineering graduate is therefore trained to appreciate how research informs teaching, according to the university mission statements.

At Levels 2, 3 and, 4 students are free to choose more than half of their module credits with the proviso a range of modules are selected that reflect the complexity of the mechanical engineering to ensure the breadth of knowledge expected of a graduate with the mechanical engineering degree. This allows students to develop their own wide-ranging interests in mechanical engineering. Decisions on what to study are made with input from personal tutors.

The research ethos is developed and fostered from the start via practical's, which are either embedded in lecture modules or taught in dedicated practical modules, research seminars, and tutorials. There is a compulsory field course in Level 1, which students must pass in order to progress into Level 2, and optional field courses in Levels 2, 3 and 4. At Level 4 all students carry out an independent research project, which deals with theoretical or experimental studies in the fields of power or applied mechanics under the supervision of professional supervisory teams.

Academic tutorials are held at all levels with tutors who provide continuity and progressive guidance. All levels include a number of workshops to teach skills, e.g. use of library and presentation skills, followed by assessed exercises, e.g. essays and talks, as opportunities to practice these skills in a subject-specific context.

3. Program Goals

1. Providing the community with specialized engineering expertise and competencies in the field of mechanical engineering by raising the level of graduates in terms of knowledge, skills and research.

2. Creating a university environment that stimulates the capabilities of the university professor and student and encourages qualitative scientific productivity.

3. Developing scientific, research, professional and educational capacities, and capabilities to reach a state of competition at the local and international levels.

4. Developing the administrative and scientific work system in the department, which makes it productive.

5. Achieving integration between the educational outputs and the labor market in order to form a solid scientific basis for solving industrial and service problems in the country.

6. Opening up to society locally, in the Arab world, and globally, and enhancing communication for the purpose of achieving the desired goals.

4. Student Learning Outcomes

These student learning outcomes in Mechanical Engineering ensure that graduates are well-prepared to contribute to the design, development, and operation of mechanical systems in diverse industries such as automotive, aerospace, energy, manufacturing, and robotics.

1. Technical Competence: Mechanical Engineering students will develop a strong foundation in core engineering principles and acquire technical expertise in areas such as thermodynamics, mechanics, materials science, and control systems. They will demonstrate proficiency in applying this knowledge to solve complex engineering problems.
2. Design and Innovation: Students will gain the skills to design and innovate mechanical systems and components. They will be able to analyze requirements, develop conceptual designs, and apply engineering principles to create efficient, reliable, and sustainable solutions.
3. Experimental and Analytical Skills: Mechanical Engineering students will develop the ability to conduct experiments, analyze data, and draw meaningful conclusions. They will utilize laboratory equipment and computational tools to evaluate the performance of mechanical systems and validate design solutions.
4. Teamwork and Communication: Students will work effectively in multidisciplinary teams, demonstrating collaboration, leadership, and effective communication skills. They will be able to contribute constructively to group projects, present technical information clearly, and collaborate with professionals from diverse backgrounds.
5. Professional Ethics and Responsibility: Mechanical Engineering graduates will understand the ethical and professional responsibilities associated with their profession. They will adhere to high standards of integrity, demonstrate awareness of environmental and societal impacts, and prioritize safety and sustainability in their engineering practices. 6. Lifelong Learning and Adaptability: Students will develop a mindset of continuous learning and adaptability to evolving technologies and industry trends. They will engage in professional development activities, stay updated with advancements in the field, and possess the skills to adapt to new challenges and technologies throughout their careers.

5. Academic staff

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6. Credits, Grading and GPA

Credits

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

Grading

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

GRADING 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.				

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 ^{m}odule score x ECTS) + (2nd ^{m}odule score x ECTS) + ……] / 240

7. Curriculum/Modules

Semester 1| 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
E111	**Mathematics I**	**63**	**62**	**5**	**B**	
ME112	**Static Engineering Mechanics**	**78**	**47**	**5**	**C**	
ME113	**Principles of Production Engineering and Workshops I**	**93**	**57**	**6**	**C**	
E114	**Chemistry**	**33**	**42**	**3**	**S**	
E115	**Engineering Drawings**	**93**	**82**	**7**	**B**	
U116	**English Language**	**63**	**37**	**4**	**B**	

Semester 2| 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
E121	**Mathmatics II**	**63**	**62**	**5**	**B**	
ME122	**Dynamic Engineering Mechanics**	**63**	**62**	**5**	**C**	
ME123	**Principles of Production Engineering and Workshops II**	**48**	**27**	**3**	**B**	
E124	**Physics**	**33**	**42**	**3**	**S**	
ME125	**Electrical Engineering**	**123**	**52**	**7**	**S**	
U126	**Principles of Computer Science and Programming**	**123**	**52**	**7**	**B**	

Semester 3| 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
E211	**Engineering Mathmatics I**	**63**	**62**	**5**	**B**	
ME212	**Fluid Statics**	**48**	**52**	**4**	**C**	
ME213	**Thermodynamics I**	**48**	**52**	**4**	**C**	
ME214	**Mechanics of Materials**	**78**	**47**	**5**	**C**	
ME215	**Mechanical Drawing**	**93**	**57**	**6**	**C**	
ME216	**Programming of Computers**	**108**	**42**	**6**	**B**	

Semester 4| 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
E221	**Engineering Mathmatics II**	**63**	**62**	**5**	**B**	
ME222	**Fluid Dynamics**	**93**	**57**	**6**	**C**	
ME223	**Thermodynamics II**	**93**	**57**	**6**	**C**	
ME224	**Strenght of Materials**	**48**	**52**	**4**	**C**	
ME225	**Engineering Metallurgy**	**108**	**67**	**7**	**C**	
U226	**Advanced Programming**	**33**	**17**	**2**	**S**	

Semester 5| 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
E311	**Engineering Analysis**	**63**	**62**	**5**	**B**	
ME312	**Heat Transfer I**	**48**	**52**	**4**	**C**	
ME313	**Theory of Mechanism**	**93**	**32**	**5**	**C**	
ME314	**Interal Combustion Engines I**	**93**	**32**	**5**	**C**	
ME315	**Gas Dynamics**	**48**	**52**	**4**	**C**	

ME316	**Manufacturing Process**	**108**	**67**	**7**	**C**	

Semester 6| 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
E321	**Numerical Analysis**	**78**	**47**	**5**	**B**	
ME322	**Heat Transfer II**	**93**	**57**	**6**	**C**	
ME323	**Theory of Machines**	**48**	**27**	**3**	**C**	
ME324	**Interal Combustion Engines II**	**48**	**27**	**3**	**C**	
ME325	**Turbo Machinery**	**93**	**57**	**6**	**C**	
ME326	**Electrical Machines**	**108**	**67**	**7**	**S**	

Semester 7| 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ME411	**Design of Machine Elements I**	**108**	**67**	**7**	**C**	
ME412	**Power Plant**	**123**	**77**	**8**	**C**	
ME413	**Theory of Vibrations**	**48**	**27**	**3**	**C**	
ME414	**Control**	**48**	**27**	**3**	**C**	
ME415	**Engineering Materials**	**63**	**62**	**5**	**C**	
ME416	**Engineering Project**	**78**	**22**	**4**	**S**	

Semester 8| 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ME421	**Design of Machine Elements II**	**63**	**62**	**5**	**C**	
ME422	**Air**	**123**	**52**	**7**	**C**	

	Conditioning and Refrigeration					
ME423	**Vibration Applications**	**93**	**32**	**5**	**C**	
ME424	**Measurements**	**78**	**47**	**5**	**C**	
ME425	**Industrial Engineering**	**63**	**62**	**5**	**S**	
ME416	**Engineering Project (contnued)**	**48**	**27**	**3**	**S**	

8. Contact

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Semester one

Semester one	Mathematics I	E111

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E111**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Sameer F. Hamad		**e-mail**	Sfhamad4@uomisan.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	23/06/2023		**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	Mathematics contributes to the core of engineering and serves as a source of knowledge from which engineering students can draw from. Thus, engineering students must have an ability to apply mathematical knowledge and skills to problem solving and engineering design tasks. Simply having mathematical or engineering knowledge without understanding of how to apply the learned strategies can limit a student's ability to provide correct answer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students after passing this course will be able to understand the basic mathematics principles and having the ability to deal with various derivative problems which makes him eligible to understand new more complicated topics.
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 محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
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)	2-11	All
	Assignments	5	5% (5)	2-12	All
	Home work	10	10% (10)	4-13	All
	Report	--	--	--	--
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The definition of functions, Domains, and Ranges
Week 2	Sums, differences, products, quotients composition of functions
Week 3	The absolute value function
Week 4	The graph of functions
Week 5	The trigonometric functions. The graph of the functions
Week 6	The inverse of trigonometric functions
Week 7	The Limits and Continuity Calculating Limits Using the Limit Laws, Properties of Limits, Limits of Trigonometric Function, Special Trigonometric Limits
Week 8	Limit involving infinity
Week 9	Continuous functions
Week 10	Differentiation: The definition of derivative. Rules for Differentiating Functions
Week 11	Implicit Differentiation and the higher derivatives
Week 12	Derivatives of trigonometric functions
Week 13	The chain rule
Week 14	Hyperbolic functions, Exponential Functions, Rules and Properties of the Exponential Functions, The Derivative and Integration of Exponential Function, The Exponential Function for Bases other Than (e) (a^x and $\log_a{}^x$), Derivative and Integration the Exponential Function.
Week 15	Integration The Definite Integral, Basic Integration Rules, Integration of Trigonometric Functions, The Area under the Curve, The Natural Logarithmic Function, The Derivative and Integration of Natural Logarithmic Function.

Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus, G B. Thomas, R.L.Finney, M.D. Weir, Addison-Wesley; 12th 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.

Semester one	Static Engineering Mechanics	ME112

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mechanical Engineering Static**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME112**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Firas Lattef Hussany		**e-mail**	firaslattef@uomisan.edu.iq	
Module Leader's Acad. Title	Assist. Lect.		**Module Leader's Qualification**	Master	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Mechanical engineering Dynamic	**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	The module aims are: 1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in its private and public sectors in static mechanics through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of static mechanics, both theoretical and practical, to comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of static mechanics in general, and studying and analyzing loads (such as forces, torques and rotations) in physical systems in a state of static equilibrium. 4. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills. 5. Building and developing partnerships with the governmental and private sectors
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: A- Knowledge and Understanding a) Practice the basic skills of analyzing simple mechanical systems. b) acquire skills in analyzing mechanical systems that are in a constant

	state of equilibrium c) acquire basic skills in focusing on a free body diagram and on choosing an appropriate coordination system B. Subject-specific skills a. Ability to analyze mechanical systems. b. The ability to think about addressing a particular problem or issue. c. Solve mechanical problems. d. The ability to gain experience in dealing with mechanical systems
Indicative Contents المحتويات الإرشادية	• Readings, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework. • Directing students to some websites to benefit and develop capabilities. • Conduct seminars to explain and analyze a specific issue and find • solutions to it.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Readings, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework. • Directing students to some websites to benefit and develop capabilities

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

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (10)	5, 10	LO # 1, 2, 8,9 and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6, 7 and 13
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	LO # 5, 11 and 12
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	**Fundamental Concepts of static** **Composition and Resolution of forces**
Week 2	**Resolution of forces in space**
Week 3	**Couple and moment** **Transformation of a couple, Resolution of a force into a force and couple**
Week 4	**Resultant of Forces system**

Week 5	**Resultant of a Concurrent Non-Coplanar Force**
Week 6	**Free Body Diagrams (F.B.D)**
Week 7	**equilibrium**
Week 8	**Trusses**
Week 9	**Friction part 1**
Week 10	**Friction part 2**
Week 11	**Centroids and Centers of Gravity by Integration**
Week 12	**Centroids and Centers of Gravity of Composite Area and Bodies**
Week 13	**Second Moments or Moments of Inertia**
Week 14	**second moments of Areas by Integration**
Week 15	**Moments of Inertia of Composite Area**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	**1-Higdon.** **2- Meriam** .	Yes
Recommended Texts	**1-Hibbeler.** **2- Beer** .	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.

Semester one	Principles of Production Engineering	ME113

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Principles of Production Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME113**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Dr. Mohammed Razzaq Mohammed		**e-mail**	mohammedrazzaq14@uomisan.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	18/06/2023		**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	After completing this course, students should be able to do the following: • Cite sources of engineering materials. • Explain the principles of production processes, and how the type of engineering material and the procedure used for making specific product can be selected. • Define engineering stress and engineering strain. • Define mechanical properties of materials such as tensile strength, ductility, toughness and hardness. • Name and describe hardness testing techniques. • Name and describe the two impact fracture testing techniques. • Explain the different types of metal production processes and their performance. • Describe recrystallization in terms of both the alteration of microstructure and mechanical characteristics of the material. • Identify various manufacturing processes and conduct some calculations about finding force and power of some metal forming processes such as rolling and extrusion. • Name and briefly describe some of important types of welding processes. • Name and describe forming operations that are used to shape polymers and ceramics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main outcome is that graduate mechanical engineer can deal with methods, applications, problems, calculations and design related to engineering materials, manufacturing processes and welding technology.
Indicative Contents المحتويات الإرشادية	Introduction to principle production engineering, evaluating the materials extraction and production, manufacturing processes and welding.

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 محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	All
	Assignments	2	10% (10)	2, 12	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative	**Midterm Exam**	2 hr	10% (10)	7	All

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Engineering Materials, Mechanical Properties of Materials
Week 2	Extraction and Production of Ferrous Metals: Production of iron and steel
Week 3	Extraction and Production of Non-Ferrous Metals: Production of Aluminum, Copper and Zinc
Week 4	Metal Forming Processes
Week 5	Hot and Cold Working Processes
Week 6	Rolling/ Types of Rolling Mills
Week 7	Flat Rolling and Its Analysis
Week 8	Extrusion Processes, Analysis of Extrusion
Week 9	Wire and Tube Drawing
Week 10	Deep Drawing
Week 11	Welding Processes/ Fusion welding and Pressure welding
Week 12	Gas Welding Process, Arc Welding and Electric Resistance Welding
Week 13	Polymer Forming Techniques
Week 14	Plastic Forming Techniques
Week 15	Ceramic Forming Techniques
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Mechanical Properties of Materials
Week 2	Lab 2: Tension Test
Week 3	Lab 3: Hardness Test
Week 4	Lab 4: Impact test
Week 5	Lab 5: Metal Forming Processes: Rolling
Week 6	Lab 6: Extrusion Processes
Week 7	Lab 7: Drawing Processes
Week 8	Lab 8: Wire Drawing
Week 9	Lab 9: Tube Drawing
Week 10	Lab 10: Deep Drawing
Week 11	Lab 11: Welding Processes - Fusion welding
Week 12	Lab 12: Welding Processes - Pressure welding
Week 13	Lab 13: Plastic Forming Techniques
Week 14	Lab 14: Ceramic Forming Techniques
Week 15	Lab 15: Final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Materials Science and Engineering an Introduction, William D. Callister, JR. and David G. Rethwisch.	No
Recommended Texts	Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, Mikell P. Groover.	No
Websites	YOUTUBE	

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.

Semester one	Chemistry	E114

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**chemistry**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E114**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Hanan hashim abid		**e-mail**	hananalmaula@uomisan.edu.iq	
Module Leader's Acad. Title	Assist lecture		**Module Leader's Qualification**	master	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	30/06/2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	chemistry	**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. Knowledge of Atomic Structure and Bonding: Understand the structure of atoms, electronic configurations, chemical bonding, and hybridization, which form the basis for understanding the behavior of chemical substances. 2. Understanding of Radioactivity and Nuclear Chemistry: Explore the principles of radioactivity, nuclear stability, radioactive decay, and applications of nuclear chemistry in tracers, dating, and power sources. 3. Knowledge of Cement Chemistry: Study the chemistry of cement, including electrochemical corrosion, hydration reactions, and the weathering of cement. 4. Understanding of Thermal Chemistry and Chemical Kinetics: Learn about exothermic and endothermic reactions, the heat of formation, fuel and water gas, rocket propulsions, energy, and collision. Study the kinetics of chemical reactions and the factors that influence reaction rates. 5. Knowledge of Acids and Bases: Gain an understanding of the chemistry of acids and bases, including water treatments, dissociation constants, acid and base strength, pH scale, sterilization, clarification, and boiler feed water. 6. Understanding of Petroleum Refining: Explore the chemistry involved in petroleum refining, including boiling point diagrams and processes for separating and processing hydrocarbons. 7. Knowledge of Hydrocarbons and Aromatic Compounds: Study the structure of benzene, homologs of benzene, reactions involving benzene substitution, as well as alcohol synthesis, ester formation, and reactions of phenols. Overall, these modules aim to provide students with a comprehensive understanding of key concepts and principles in chemistry that are relevant to mechanical engineering. This knowledge will enable students to apply chemical principles in analyzing and solving engineering problems, understanding materials and their properties, and making informed decisions related to chemical processes and reactions in mechanical engineering applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Understand the fundamental principles and concepts of chemistry, including atomic structure, chemical bonding, and chemical reactions. Apply chemical knowledge to analyze and predict the properties and behavior of materials used in mechanical engineering, such as

	metals and composites. Demonstrate an understanding of the relationship between chemical processes and mechanical engineering applications, such as corrosion, combustion, and heat transfer. Demonstrate awareness of ethical and safety considerations in handling and working with chemical substances .
Indicative Contents المحتويات الإرشادية	1. Atomic Structure and Bonding: • Atomic theory: Historical development, models of the atom (e.g., Bohr model, quantum mechanical model) • Electronic structures: Electron configuration, energy levels, orbitals • Chemical bonding: Ionic, covalent, and metallic bonding; Lewis structures; VSEPR theory • Hybridization: Hybrid orbitals, molecular geometry, hybridization in organic molecules 2. Radioactivity / Periodic Tables / Material State: • Radioactivity: Types of radiation, nuclear decay, half-life, radioactive dating • Periodic table: Periodic trends (e.g., atomic size, ionization energy, electronegativity) • Material states: Solid, liquid, gas; phase transitions; phase diagrams 3. Cement / Electrochemical Corrosion: • Cement: Hydration reactions, setting and hardening of cement, properties of concrete • Electrochemical corrosion: Galvanic cells, corrosion mechanisms, corrosion prevention techniques 4. Thermal Chemistry / Chemical Kinetics: • Exothermic and endothermic reactions: Energy changes, heat transfer, enthalpy • The heat of formation: Calculation of enthalpy changes, Hess's law • Fuel and water gas: Combustion reactions, energy content of fuels, water-gas shift reaction

	• Rocket propulsion: Principles of rocket engines, propellant combustion • Energy and collision: Activation energy, reaction rates, collision theory 5. Chemistry of Acids and Bases / Water Treatments: • Dissociation constants: Acid and base dissociation, pH, pOH • Acid and base strength: Strong and weak acids/bases, acid-base equilibrium • Water treatment: Water purification methods, disinfection techniques, water quality parameters • Boiler feed water: Water treatment for steam generation, corrosion control • Petroleum refining: Crude oil composition, refining processes (e.g., distillation, cracking) 6. Hydrocarbons, Aromatic Compounds, Alcohol: • Hydrocarbons: Alkanes, alkenes, alkynes, isomerism, reactions (e.g., combustion, addition) • Aromatic compounds: Structure of benzene, aromaticity, reactions (e.g., substitution) • Alcohol: Structure, nomenclature, synthesis, reactions, ester formation • Phenol: Properties, reactions (e.g., electrophilic aromatic substitution)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Implement active learning strategies such as problem-solving exercises, case studies, and group discussions, for students with engineering problems that require the application of chemical knowledge and skills to find solutions. Encourage students to analyze and solve these problems, fostering critical thinking and problem-solving abilities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	5, 10	All
	Assignments	2	5% (5)	2, 12	All
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	All
	Final Exam	3 hr	70% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	• Atomic Structure and Bonding • Atomic Theory • the nuclear Atoms
Week 2	• Electronic Structures • Chemical Bonding

	• Hybridization
Week 3	• Radioactivity • Periodic Tables • Material State
Week 4	Nuclear Stability, • Radioactive decay • Tracers • Dating • Power Sources
Week 5	• Cement • Electrochemical Corrosion • Hydration Reaction • Weathering of Cement • quiz
Week 6	• Thermal Chemistry • Chemical Kinetics • Exothermic And Endothermic Reaction
Week 7	• heat of Formation • fuel and Water gas • Rocket Propulsions • Energy and collision
Week 8	• Chemistry of acids and bases • Water Treatments • Dissociation Constants
Week 9	• The Strength of Acid and Bases • The PH Scale • Known Acid and Base
Week 10	• Sterilization • Clarification • Boiler feed Water • Boiling point Diagram Petroleum Refining • Quiz.
Week 11	

	• Hydrocarbons • Aromatic Compounds
Week 12	• Benzene Structure • Substitution of Benzene.
Week 13	• Homologues of Benzene • substitution in benzene ring
Week 14	• Alcohol • synthesis of Alcohol
Week 15	• Ester Formation, • reaction of Phenol
Week 16	**A preparatory week before the Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	General Chemistry: Principles and Modern Applications" by Ralph H. Petrucci, F. Geoffrey Herring, Jeffry D. Madura, and Carey Bissonnette.	Yes
Recommended Texts	Principles of Modern Chemistry" by Oxtoby, Gillis, and Campion.	yes
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition

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

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

Semester one	Engineering Drawings	E115

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Drawing**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**E115**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Mushtaq Abdul Kareem Hussein		**e-mail**	mushtaqkareem@uomisan.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Firas Lattef Hussany		**e-mail**	firaslattef@uomisan.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To learn the rules and fundamentals of engineering drawing. 2. Knowledge of engineering drawing tools and how to use them. 3. Learn to read and write notes on engineering drawings. 4. To learn how to create 2D projections from 3D drawings. 5. To be able to read and write drawing measurements. 6. The ability to draw 3D shapes. 7. The ability to draw engineering sections.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowing the tools used in engineering drawing and how to use them properly. 2. The student's ability to understand and apply the basics of engineering drawing. 3. Reading, disassembling and assembling geometric shapes through drawing, projection and cross sectional methods. 4. Developing the student's skill in using tools in drawing geometric shapes. 5. Developing the student's engineering imagination through deducing the projections and sections of each geometric solid and realizing its dimensions. 6. Communicate with the most important ideas presented by the article through Internet.
Indicative Contents المحتويات الإرشادية	1. Introduction to the subject: basics of engineering drawing and

	the difference between it and free drawing: Engineering drawing, its elements, tools and drawing methods. 2. Introducing students to paper scales and drawing boards. 3. Layout the sheets (frame, table, etc.), Types of lines in engineering drawing, Rules for writing dimensions and measurements and recognizing symbols and their significance, Drawing scales (zoom in and zoom out). 4. Engineering drawing operations: Create and divide angles, Divide circles and draw regular shapes in them. Create connecting lines between arcs and circles. 5. Projection in orthogonal planes, vertical projection methods, Drop geometric shapes. 6. Drawing engineering perspectives, types of engineering perspectives and its construction from projections. 7. Distribution of projections on the drawing sheet, Conclusion of the third projection from two projections. 8. Inferring the isometric perspective from projections with dimensions. 9. Sections in engineering drawing, their importance, Non-Cut Parts, Notes on sections, types of sections and their classification. 10. Using real 3D models to help students see the 2D model drawn in the book (as a way of elucidation more acceptable to students).

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 class training, 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 exercises involving some drawings that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SSWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SSWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured USSWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured USSWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	4, 9,12,15	LO #1- #3 and LO #4 - #8 and LO #9 - #11 and LO #12- #14
	Classwork	15	15% (15)	Continuous	Continuous
	Homework	15	15% (15)	Continuous	Continuous

Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #1- #6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Introduction to engineering drawing , Drawing tools.
Week 2	Line types, Notes on lines drawings , straight line operations.
Week 3	Circle and arc operations.
Week 4	• Polygon operations , Ellipse operation. • **Quiz 1**
Week 5	Tangential lines.
Week 6	Parallel projection, Orthographic projection.
Week 7	• 1st and 3rd Angles projection, Concluding 3rd projector, Notes on projections. • **Midterm Exam**
Week 8	Section lines, Full sections, Section planes, Half sections, Zigzag sections.
Week 9	• Partial sections , Non-cut parts, Notes on sections. • **Quiz 2**
Week 10	Theory of dimensions, Dimension elements, Oblique dimensions, Dimension symbols.
Week 11	Leader dimensions, Circle and angle dimensions.
Week 12	• Notes on dimensions. • **Quiz 3**
Week 13	Metric drawing.
Week 14	Oblique drawing.
Week 15	• Perspective drawing. • **Quiz 4**

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Systematic engineering drawing book , author Jaafar Al-Khafaf	Yes
Recommended Texts	• Luzadder, Fundamentals of Engineering Drawing, Prentice. • French, C.J. Vierck and R.J. Foster, Engineering Drawing and Graphic Technology, McGraw-Hill, 1981.	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.

Semester one	English Language	U116

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	English Language			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**U116**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Huda Radhi Jabbar		e-mail	Huda198806@gmail.com	
Module Leader's Acad. Title	Assist lecture		Module Leader's Qualification	Master	
Module Tutor	Name (if available)		e-mail	E-mail	
Peer Reviewer Name	Name		e-mail	E-mail	
Scientific Committee Approval Date	2/07/2023		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	English Language	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 of an English: 1. Developing language skills: The primary aim of an English class is to help students develop their skills in speaking, listening, reading, and writing in English. This includes improving vocabulary, grammar, pronunciation, and comprehension abilities 2.Enhancing communication skills: English classes aim to improve students' ability to communicate effectively in English. This involves developing fluency, accuracy, and confidence in spoken and written communication. 3. Building reading and comprehension skills 4. Developing writing skills.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Learning outcomes in an English class refer to the specific knowledge, skills, and abilities that students are expected to achieve by the end of the course. These outcomes can be aligned with the aims of the class and can vary depending on the level and focus of the course. Here are some examples of learning outcomes for an English class: 1. Listening Skills: Demonstrate improved listening comprehension in various contexts, such as lectures, conversations, and audio recordings 2. Speaking Skills: Communicate effectively in English in both formal and informal situations. 3. Reading Skills: Read and comprehend a variety of texts, including literary works, articles, and informational materials. 4. Writing Skills: Produce well-structured, coherent, and grammatically correct written texts. 5.Language Autonomy: Take responsibility for ongoing language learning and self-improvement
Indicative Contents المحتويات الإرشادية	The main indicative contents are: Reading comprehension (2hr). Present simple, Present Continuous (2hr). Past Simple, Past Continuous (2hr). Future Simple (1hr) Future Continuous(1hr)

	Simple Statement(1hr) Conditional Statements (Types I, II, III),(3hr) Indirect Questions (2hr) Definite and Indefinite Articles (2hr) Idioms (2hr) Present Perfect (1hr). Past perfect (1hr). Passive voice (3hr). Compound and complex statement(2hr). Prepositions (2hr).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In an English class, various teaching strategies can be employed to facilitate effective language learning and achieve the desired learning outcomes. Here are some strategies commonly used in English language instruction: 1. Communicative Approach: Emphasize meaningful communication and interaction in English by engaging students in real-life situations, role-plays, discussions, and pair/group activities. 2. Language Immersion: Create an immersive environment where English is the primary language of instruction and communication, encouraging students to actively use and practice the language. 3. Task-Based Learning: Structure activities around real-life tasks that require the use of English language skills, such as problem-solving, decision-making, and project work, to promote active learning and language application. 4. Cooperative Learning: Foster collaboration and teamwork among students by assigning group projects, pair work, and cooperative tasks that promote peer-to-peer interaction and mutual support in English language practice.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	• Reading comprehension.
Week 2	• Present simple. • Present Continuous,
Week 3	• Past Simple. • Past Continuous.

Week 4	• Future Simple
Week 5	• Future Continuous • Quiz
Week 6	• Simple Statement
Week 7	• Conditional Statements (Types I, II, III)
Week 8	• Indirect Questions
Week 9	• Definite and Indefinite Articles
Week 10	• Idioms. • Quiz.
Week 11	• Present Perfect
Week 12	• Past perfect
Week 13	• Passive voice
Week 14	• Compound and complex statement
Week 15	• Prepositions
Week 16	• **Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Headway plus, John and liz soars	Yes
Recommended Texts		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.

Semester two

Semester two	Mathematics II	E121

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E111**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Sameer F. Hamad		**e-mail**	Sfhamad4@uomisan.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	23/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics I	**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	Mathematics contributes to the core of engineering and serves as a source of knowledge from which engineering students can draw from. Thus, engineering students must have an ability to apply mathematical knowledge and skills to problem solving and engineering design tasks. Simply having mathematical or engineering knowledge without understanding of how to apply the learned strategies can limit a student's ability to provide correct answer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students after passing this course will be able to understand the basic mathematics principles and having the ability to deal with various derivative problems which makes him eligible to understand new more complicated topics.
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 محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
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)	2-11	All
	Assignments	5	5% (5)	2-12	All
	Home work	10	10% (10)	4-13	All
	Report	--	--	--	--
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Application of integration : Area between curves and under curves
Week 2	Application of integration : The volume of solids (Disk and Washer methods)
Week 3	Application of integration : The cylindrical shell method
Week 4	Application of integration : Lengths of curves in the plane ,
Week 5	Application of integration : Areas of Surfaces of Revolution
Week 6	Techniques of integration: Integration by Parts, Trigonometric Integrals, Trigonometric Substitutions.
Week 7	Substitution and long division integrals
Week 8	Integration of Rational Functions by Partial Fractions.
Week 9	Integrals of tan x and cot x
Week 10	Integration of Logarithmic Functions
Week 11	Numerical Integration: The Trapezoidal Rule
Week 12	Numerical Integration: The Simpson's Rule.
Week 13	Polar Coordinate Areas and Lengths in Polar Coordinates.
Week 14	Graphing in Polar Coordinates
Week 15	Matrices
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus, G B. Thomas, R.L.Finney, M.D. Weir, Addison-Wesley; 12th 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.

Semester two	Dynamic Engineering Mechanics	ME122

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mechanical Engineering Dynamic**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME122**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Firas Lattef Hussany		**e-mail**	firaslattef@uomisan.edu.iq	
Module Leader's Acad. Title	Assist. Lect.		**Module Leader's Qualification**	Master	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mechanical engineering Static	**Semester**	1

Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The module aims are: The theoretical foundations of Engineering Mechanics Dynamics have expanded substantially in recent years. The objective of this course is to introduce students to this fundamental area of Engineering Mechanics Dynamic which enables students to focus on the Kinematics of Particles. The course exposes students to knowing POSITION, VELOCITY, AND ACCELERATION as well as determination of the motion of particles, the motion of several particles and Dependent Motions. The course introduces basic of Newton's Second Law in Rectangular Components and Tangential and Normal Components and Energy and Momentum Methods and PRINCIPLE OF WORK AND ENERGY, POTENTIAL ENERGY, CONSERVATION OF ENERGY. Upon completion of this course, the students are expected to become proficient in Engineering Mechanics Dynamic, and to have the opportunity to explore the current topics in this area.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. Recognize how to find the velocity and acceleration. 2. The effect of the path for calculating velocity and acceleration. 3. Effect of rectilinear and curve path in velocity and acceleration. 4. Study velocity and acceleration in circler path . 5. Relative motion. 6. Effect of the forces on velocities and acceleration.
Indicative Contents	• Subject-specific skills • Skills objectives of the course.

المحتويات الإرشادية	• The ability to analyze the problem and write the steps for the solution in a simpler way. • The ability to think about addressing a particular problem or issue. • Writing scientific reports. • The ability to gain experience in dealing with complex mechanical systems.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Readings, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework. • Directing students to some websites to benefit and develop capabilities. • Conduct seminars to explain and analyze a specific issue and find • solutions to it.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (10)	5, 10	LO # 1, 2, 8,9 and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6, 7 and 13
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	LO # 5, 11 and 12
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	**Rectilinear Kinematics: Continuous Motion**
Week 2	**Rectilinear Kinematics: Erratic Motion:**
Week 3	**General Curvilinear Motion**
Week 4	**Curvilinear Motion: Motion of a Projectile:**
Week 5	**Curvilinear Motion: Normal & Tangential Components:**
Week 6	**Curvilinear Motion: Cylindrical Components:**
Week 7	**Absolute Dependent Motion: Analysis of two particles:**

Week 8	**Relative Motion: Analysis of two particles using Translating axes**
Week 9	**Equation of Motion: Rectangular Coordinates**
Week 10	**Equation of Motion: Normal and Tangential Coordinates**
Week 11	**Equation of Motion: Cylindrical Coordinates**
Week 12	**Work and Energy**
Week 13	**Conservative Forces and Potential Energy**
Week 14	**Principles of Linear Impulse and Momentum**
Week 15	**Principle of Linear Impulse and Momentum for a System of Particles**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**1-Higdon.** **2- Meriam** .	Yes
Recommended Texts	**1-Hibbeler.** **2- Beer** .	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.

Semester two	Engineering Workshops	ME123

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Workshops**			**Module Delivery**	
Module Type	**B**			☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME123**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level		1	**Semester of Delivery**		2
Administering Department		Mech. Department	**College**	Engineering College	
Module Leader	Dr. Mohammed Razzaq Mohammed		**e-mail**	mohammedrazzaq14@uomisan.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		22/06/2023	**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	After completing this course, students should be able to do the following: • Identify some of the reasons why machining is commercially and technologically important. • Name the three most common machining processes. • Cite the two basic categories of cutting tools in machining. • List the various operations which may be performed on a center lathe. • Describe some methods of taper-turning on a center lathe. • Describe the various kinds of drilling machines. • Describe a horizontal milling machine. • Explain the difference between peripheral milling and face milling. • Describe the cylindrical grinding operation, and give an idea of the grinding wheel and work speeds recommended for this operation. • Describe the surface grinding operations with disc as well as cup type wheel. • Distinguish between fusion and pressure welding processes. • Describe the arc welding process. • Describe the principle of oxyacetylene gas welding. • Distinguish between welding, brazing and soldering. • Cite the requisite properties in a good foundry sand. • Describe the procedure of making a mold with a two piece split pattern. • Enumerate some common casting defects and explain the reasons which cause these defects. • Explain the difference between open and closed die forging techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main outcomes are: • Students would be able to work on various pieces of equipment and machines in different workshops such as turning, milling, and grinding. • Students would also be able to fabricate products using some manufacturing processes such as casting and forging, and join metallic materials using welding operations, brazing and soldering.

Indicative Contents المحتويات الإرشادية	Cutting Tools, Drilling Machine, Boring Tools, Arc welding equipment, Oxy-acetylene welding equipment, Turning machine (lathe), Cutting machine, Drilling machine, Milling machine, Sand Casting, Forging.

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 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	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**	2	10% (10)	5, 10	All
	Assignments	2	10% (10)	2, 12	All
	Projects / Lab.				
	Report	5	20% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	

Week 13	
Week 14	
Week 15	
Week 16	

Delivery Plan (Weekly workshop Syllabus) المنهاج الاسبوعي للورش	
	Material Covered
Week 1	**CARPENTRY**: Carpentry Tools, Cutting Tools, Planes
Week 2	Boring Tools, Jigsaw, Power planes, Circular saw, Router Cutters, Orbital Sander
Week 3	**FITTING:** Holding Tools, Striking Tools, Cutting Tools
Week 4	Measuring, Marketing and Testing Tools, Impact Driver, Chain Saw, Angle Grinder
Week 5	Drilling Machine, Nail Gun, Impact Wrench, Cut-off Machine
Week 6	**WELDING:** Arc welding equipment
Week 7	Gas welding: Oxy-acetylene welding equipment
Week 8	Soldering equipment, Brazing equipment
Week 9	**TURNING:** Turning machine (lathe)
Week 10	Cutting machine
Week 11	Drilling machine
Week 12	Milling machine
Week 13	**CASTING:** Furnaces
Week 14	Sand Casting, Molding box, Cores, Casting inspection equipment

Week 15	**FORGEABILITY:** Anvil, Forging Hand Tools, Hammers, Tongs, Hearth, Swage block
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		
Recommended Texts	Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, Mikell P. Groover.	No
	Manufacturing Processes, H.N. Gupta, R.C. Gupta, and Arun Mittal.	No
Websites	YOUTUBE	

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.

Semester two	Physics	E124

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Physics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E127**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level		1	**Semester of Delivery**		2
Administering Department		Mech. Department	**College**	Engineering College	
Module Leader	Hanan hashim abid		**e-mail**	hananalmaula@uomisan.edu.iq	
Module Leader's Acad. Title		Assist lecture	**Module Leader's Qualification**		Master
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		30/06/2023	**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	physics	**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. to provide an understanding of the behavior of fluids at rest, including topics such as liquid pressure, pressure measurement, surface tension, Bernoulli's equation, viscosity, and the effects of turbulence. Students will learn how to apply these concepts to practical engineering applications. 2. to introduce students to the properties of solids, including crystalline structures, stress and strain analysis, elasticity and plasticity, and the behavior of materials under different loading conditions. Students will learn about concepts such as elasticity modulus, Poisson's ratio, and the energy stored in stressed bodies. Acquire knowledge and skills in the measurement and analysis of physical quantities, including the use of appropriate instruments and units. 3. to familiarize students with temperature measurement techniques and the thermal properties of materials. Topics covered may include different types of thermometers, thermal expansion of materials, thermal impedance, and phase transformations in materials due to temperature changes. 4. focuses on the study of motion, including the equations of motion, simple harmonic motion (such as pendulums), damped motion, forced motion, and wave motion. Students will learn how to analyze and solve problems related to these types of motion. 5. to provide an understanding of sound waves, including their power and intensity, the relationship between sound and temperature, and the Doppler phenomenon. Students will learn about the properties and behavior of sound waves in different media.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Static Fluids: • Understand the principles of fluid pressure and its measurement. • Apply Bernoulli's equation to analyze fluid flow in various situations. • Explain the concept of surface tension and its practical applications. • Understand the behavior of fluids under turbulent conditions. • Analyze and solve problems related to fluid viscosity and flow.

	2. Material Properties: • Describe different types of crystalline solids and their structures. • Analyze stress and strain in materials and understand their behavior under different loading conditions. • Calculate elasticity modulus and Poisson's ratio for materials. • Evaluate the energy stored in stressed bodies and understand their elastic and plastic behavior. 3. Temperature Measuring: • Explain the working principles of different types of thermometers. • Understand the concept of thermal expansion and its measurement. • Analyze phase transformations in materials due to temperature changes. • Evaluate the thermal properties of materials and their implications in engineering applications. 4. Motion: • Apply the equations of motion to analyze and solve problems related to motion. • Understand the behavior of simple harmonic motion, such as pendulums. • Analyze damped and forced motion and their practical implications. • Understand the nature of wave motion and analyze longitudinal waves in pipes. 5. Sound Waves: • Understand the power and intensity of sound waves. • Analyze the relationship between sound and temperature. • Explain the Doppler phenomenon and its applications. • Analyze and solve problems related to the behavior of sound waves in different media.
Indicative Contents المحتويات الإرشادية	1. Static Fluids: • Understanding of liquid pressure and its measurement. • Knowledge of pressure gauges and their applications in mechanical systems. • Understanding surface tension and its effects on fluid behavior. • Application of Bernoulli's equation in fluid flow analysis. • Understanding viscosity and its role in fluid dynamics. • Understanding Poisson's law and its application to the behavior of fluids. • Understanding turbulent flow and its characterization using Reynolds number. 2. Material Properties: • Understanding the properties of solids. • Types of crystalline solids and their characteristics. • Knowledge of crystalline structures and their impact on material properties. • Understanding stress and strain in materials. • Knowledge of elasticity and plasticity in materials.

	• Understanding the concept of elasticity modulus and Poisson's ratio. • Knowledge of energy stored in stressed bodies and its implications. 3. Temperature Measuring: • Familiarity with different types of thermometers and their working principles. • Understanding thermal expansion and its effects on materials. • Knowledge of thermal impedance and its significance in thermal management. • Understanding phase transformation of materials with temperature changes. • Knowledge of thermal properties of materials, including conductivity and specific heat. 4. Motion: • Understanding the equations of motion for linear and angular motion. • Knowledge of pendulum motion and its characteristics. • Understanding damping motion and its impact on mechanical systems. • Knowledge of forced motion and resonance. • Understanding wave motion and its properties. • Knowledge of longitudinal waves in pipes and their behavior. 5. Sound Waves: • Understanding the power and intensity of sound waves. • Knowledge of the relationship between sound and temperature. • Understanding the Doppler phenomenon and its effects on sound perception.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in delivering this unit are: 1- Encourage students to participate in the exercises. This is achieved through classes and interactive educational programs. 2-Raise students' scientific and knowledge levels by employing the automatic technique, conversational approach, and active method.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	5, 10	All
	Assignments	2	5% (5)	2, 12	All
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	All
	Final Exam	3 hr	70% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Static Fluids** • liquid pressure
Week 2	• pressure gauges • Surface tension
Week 3	• Capillary effect • Bernoulli equation applications
Week 4	• Viscosity • Poisson's Law • Turbulent and Reynolds' number.
Week 5	**Material Properties** • Solids • crystalline solids types • quiz
Week 6	• crystalline structures • Stress • Strain •
Week 7	• Elasticity and plasticity • Elasticity Modulus
Week 8	• Poisson's ratio • Energy stored in a stressed body
Week 9	**Temperature Measuring** • Thermometers Types • Thermal Expansion • Thermal Impedance
Week 10	• Materials Phase Transformation • Thermal Properties of Materials • Quiz.

Week 11	**Motion** • Equation of Motion • pendulum
Week 12	• damping Motion • Forced motion
Week 13	• Wave Motion • longitudinal wave in Pipes
Week 14	. **Sound Waves** • Power and intensity • relations of sound and temperature
Week 15	• Doppler Phenomenon
Week 16	**A preparatory week before the Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	PHYSICS FOR SCIENTISTS AND ENGINEERS, Sixth Edition	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 is required but credit awarded
	F – Fail	راسب	(0-44)	A considerable amount of work required

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

Semester two	Electrical Engineering	ME125

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Electrical Engineering**		**Module Delivery**	
Module Type	S		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ME125			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level 1		**Semester of Delivery**	2	
Administering Department	Mech. Department	**College**	Engineering College	
Module Leader	Zahraa M . Alhamdawee	**e-mail**	zahraa.mo.eng@uomisan.edu.iq	
Module Leader's Acad. Title	Asst. Lecture	**Module Leader's Qualification**	M.SC	
Module Tutor		**e-mail**		
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	- فهم ومعرفة دوائر التيار المستمر -التعرف على رموز الدوائر الكهربائية للتيار المستمر. -تطوير مهارات الطالب في استخدام طرق التحليل و نظريات الشبكات. - تطوير التفكير المجرد، المنطقي والناقد والقدرة على التفكير بشكل حاسم على عملهم وعمل الآخرين
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A-The module aims are: - Identify the basic symbols and terminology of electrical engineering. - Learn the basics of DC circuits. - Know how to use analysis methods. - Knowledge of electrical network theories. -Learn to solve electrical circuits using analysis methods and network theories. **B- Skill objectives of the course** -Learn to solve problems related to electrical circuits. - Learn about the use of advanced scientific computers. - Learn how to use the shortest solutions in electrical engineering. - Learn how to find solutions to engineering problems using analysis methods.
Indicative Contents المحتويات الإرشادية	The main indicative contents are: Elect. Quantities, Charge, Elect. Force(3hr), Conductors and insulators, Current, Elect. potential and voltage, Energy, and power (3hr). Resistance & resistively(3hr), conductance & conductivity, Effect of temp. on resistance, Sources (voltage &

	current sources) (3hr), Ohms low, Kirchhoff's lows) (6hr), Series and parallel circuits(6hr), Voltage divider rule, Current divider rule(3hr), Branch current method(3hr), Mesh analysis(3hr), Star-delta and delta-star conversion(3hr), Superposition theory(3hr), Source Transformation(3hr), Thevenin's theorem(3hr), Norton's Theorem(3hr), Maximum transfer theorem(3hr),

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Raise students scientific and knowledge levels by employing the automatic technique, conversational approach, and active method. 2- The conversational method 3- Active method (depends on student activity)

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to D.C circuits Elect. Quantities Charge Elect. Force
Week 2	Conductors and insulators Current Elect. potential and voltage Energy and power
Week 3	Fundamentals of elect. Circuits Resistance & resistively
Week 4	conductance & conductivity Effect of temp. on resistance Sources (voltage & current sources)
Week 5	Ohms low Kirchhoff's lows
Week 6	Principles of elect. Circuits Series and parallel circuits
Week 7	Voltage divider rule Current divider rule
Week 8	Method of analysis Branch current method
Week 9	Mesh analysis
Week 10	Star-delta and delta-star conversion

Week 11	Network theorems. Superposition theory
Week 12	Source Transformation
Week 13	Thevenin's theorem
Week 14	Norton’s Theorem
Week 15	Maximum transfer theorem
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction
Week 2	Lab 2: Kirchhoff's Voltage and Current Laws Experiment
Week 3	Lab 3: Ohms Law
Week 4	Lab 4: Open & close Circuit
Week 5	Lab 5: Superposition
Week 6	Lab 6: Thevenin's Theorem and Kirchhoff's Laws
Week 7	Lab 7: Norton's Theorem and Kirchhoff's Laws

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Past lectures	Yes
Recommended Texts	Introductory Circuit Analysis, Boylestad	Yes
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.

Semester two	Principles of Computer Science and Programming	U126

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Principles of Computer Science and Programming**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**U126**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Mohammed Tali Qasim Almalchy		**e-mail**	Mohammed.almalchy@uomisan.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	10/06/2023		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Programming of Computers	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	**The module aims are:** 1. Introduces the student to the principles of programming language using C++ through knowing Features of C++, C++ Program parts, Contents of C++, Symbols, Reserved words, Identifiers, Library Functions, Constants, Arithmetic operators, logical tools, Priority of arithmetic and logic operations, Other expressions in C++, Exercises and solved problems. 2. Students will also understand concept of data types, variables, assignments, Input and output instructions, Conditional and Loop Statements , arrays, and functions. 3. It enables students to give them a basic background in computer programming in order to use it in solving problems (issues) that they encountered in their specialties. 4. Create programs using C++ programming language.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**The main module learning outcomes are:** 1. Introduces the student to the principles of programming language using C++. 2. Knowing the mechanism of utilizing the input and output instructions while programming. 3. Students have the ability to use and deal with Conditional & Loop Statements such as (a) if statement. (b) else-if statement. (c) Compound if. (d) switch-case statement. (e) Conditional Ternary Operator. 4. Developing student's programming skills through using Loop statements while writing programs such as (For Statement, Do-While statement, While statement, Nested loops statements). 5. Knowing how to use break and continue orders in the program code. 6. Recognize how to deal with Arrays. 7. Identify the types of matrices. 8. knowing how to read and Print Matrices. 9. Recognize the arithmetic operations on Matrices. 10. Create programs using Matrices in C++ programming language. 11. Explain the benefits of using functions, Main function, returning values.

	12. Recognize where function written in program, calling function, factors & media, declaration of functions, examples 13. Create programs using functions in C++ programming language.
Indicative Contents المحتويات الإرشادية	The main indicative contents are: <u>Fundamentals:</u> Introduction about C++,Features of C++, C++ Program parts, Contents of C++,Symbols, Reserved words, Identifiers, Library Functions, Variables, Variables Types, Characters, Boolean expressions, Constants, Arithmetic operators, logical tools, Priority of arithmetic and logic operations, Other expressions in C++,Exercises and solved problems. Introduction of Input & Output Instructions. Introduction of Arrays. Introduction of Functions, where function written in program, calling function, factors & media, declaration of functions, examples

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in delivering this unit are: 1- Encourage students to participate in the exercises. This is achieved through classes and interactive educational programmers. 2- Improving and expanding critical thinking skills at the same time and by thinking about the type of simple experiments that include some sampling activities of interest to the students. 3-Raise students scientific and knowledge levels by employing the automatic technique, conversational approach, and active method. 4- Problems Solving. 5- Independent study

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Chapter One: Introduction to Environment of C++ programming** • Introduces the student to the principles of programming language using C++ through knowing Features of C++, C++ Program parts, Contents of C++,
Week 2	**Chapter One: Introduction to Environment of C++ programming** • Symbols, Reserved words, Identifiers, Library Functions, Constants, Arithmetic operators, logical tools, Priority of arithmetic and logic operations, Other expressions in C++, Exercises and solved problems.
Week 3	**Chapter Two: Input & Output Instructions** • a) Introduction. b) Input/Output Orders.
Week 4	**Chapter Two: Input & Output Instructions** • c) Directing characters. d) Formatted Console in I/O operations.
Week 5	**Chapter Three: Conditional & Loop Statements** • 1) Conditional Statements: a) if statement. b) else-if statement. c) Compound if. • Quiz
Week 6	**Chapter Three: Conditional & Loop Statements** • 1) Conditional Statements: d) switch-case statement. e) Conditional Ternary Operator.
Week 7	**Chapter Three: Conditional & Loop Statements** • 2) Loop Statements: • a) for statement. • b) do-while statement. • c) while statement. • Midterm Exam
Week 8	**Chapter Three: Conditional & Loop Statements** • 2) Loop Statements: • . d)Nested loops statements. • e) break & continue orders. • f) Notes about loops statements.
Week 9	**Chapter Three: Review** • Exercises & Discussion
Week 10	**Chapter Four: Arrays** • Introduction • Matrices Types: One-Dimensional arrays. Two-Dimensional arrays.

	• Quiz.
Week 11	**Chapter Four: Arrays** • Reading and Printing Matrices. • Arithmetic operations on Matrices. • Remarks about Matrices.
Week 12	**Chapter Four: Arrays** • Solved Questions.
Week 13	**Chapter Five: Functions** • Introduction • Benefits of using functions • Main function, returning values • where function written in program • Report Due.
Week 14	**Chapter Five: Functions** • Calling function, factors & media, declaration of functions.
Week 15	**Chapter Five: Functions** • Examples • Review
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction about C++,Features of C++, C++ Program parts, Contents of C++,
Week 2	Lab 2: Input & Output Instructions
Week 3	Lab 3: Conditional Statements: a) if statement. b) else-if statement.
Week 4	Lab 4: Conditional Statements: c) Compound if. d) switch-case statement.
Week 5	Lab 5: Conditional Statements: e) Conditional Ternary Operator.
Week 6	Lab 6: Loop Statements: a) for statement. b) do-while statement.
Week 7	Lab 7: Loop Statements: c) while statement. d)Nested loops statements.

Week 8	Lab 8: break & continue orders.
Week 9	Lab 9: One-Dimensional arrays programs.
Week 10	Lab 10: Two-Dimensional arrays programs.
Week 11	Lab 11: Review and Solved Questions.
Week 12	Lab 12: Main function, returning values,
Week 13	Lab 13: Calling function, factors & media, declaration of functions
Week 14	Lab 14: Examples
Week 15	Lab 15: Final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1-Text of lectures 2-Fundamentals of C++ Programmong , Richard L. Halterman, School of computing, Southren of Adventist University, 2018.	Yes
Recommended Texts	Object-Oriented Programming in C++, Robert Lafore, Fourth Edition, 2002.	yes
Websites	https://www.geeksforgeeks.org/cpp-programming-basics/	

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.

Semester three

Semester three	Engineering Mathematics I	E211

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mathematics I**			**Module Delivery**	
Module Type				☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E211**				
ECTS Credits	**5**				
SWL (hr/sem)	**63**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Ali AL-MALIKI		**e-mail**	ali.al-maliki@uomisan.edu.iq	
Module Leader's Acad. Title	Teacher Assistant		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mathematics I	**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. Be educated on Mathematics methods. 2. Know the procedure of calculations. 3. Develop students understanding of useful Mathematics methods in engineering calculations. 4. Studying and solve applications using Mathematics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main outcome is a student have the knowledge of useful mathematics methods makes him deal with the problems, applications and calculations in different branches of science in mechanical engineering
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 examples and exercises, while at the same time refining

	and expanding their logical thinking skills. This will be achieved through classes, interactive tutorials and by considering solving of simple applications.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	3, 5, 10	All
	Assignments	2	10% (10)	4, 12	All
	Homework	2	10% (10)	2, 9	All
Summative assessment	**Midterm Exam**	2 hr	15% (15)	8	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Chapter One: Matrices** • Properties of matrices • Matrices types
Week 2	**Chapter One: Matrices** • Operations on matrices • Determinants • Homework
Week 3	**Chapter One: Matrices** • Matrix Inverse (Inverse of a Matrix) • Quiz.
Week 4	**Chapter One: Matrices** • solution of linear simultaneous equations • Assignment
Week 5	**Chapter Two: VECTOR CALCULUS** • Scalars and vectors, component of a vector, • rules of vector arithmetic • Quiz.
Week 6	**Chapter Two: VECTOR CALCULUS** • norm of a vector • normalizing of vectors
Week 7	**Chapter Two: VECTOR CALCULUS** • dot product • cross product, product of three or more vectors
Week 8	**Chapter two: VECTOR CALCULUS** • equations of lines in space • planes in 3-space • Midterm Exam

Week 9	**Chapter Three: VECTOR - VALUED FUNCTIONS** • Limits and continuity, derivatives, forms of a curve equation in space, parametric representation, unit tangent and normal vectors • Homework
Week 10	**Chapter Three: VECTOR - VALUED FUNCTIONS** • curvature, radius of curvature, motion along a curve, velocity, acceleration and speed, normal and tangential components of acceleration • Quiz.
Week 11	**Chapter Four: MULTIPLE INTEGRALS** • Double integral, areas and volumes
Week 12	**Chapter Four: MULTIPLE INTEGRALS** • double integral in polar coordinates • Assignment
Week 13	**Chapter Four: MULTIPLE INTEGRALS** • parametric surfaces, surface area, surface integrals
Week 14	**Chapter Four: MULTIPLE INTEGRALS** • surface integrals • evaluation of volume and triple integral
Week 15	**Chapter Four: MULTIPLE INTEGRALS** • evaluation of volume and triple integral
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	George B. Thomas, Maurice D. Weir, Joel Hass, Frank R. Giordano - Thomas's calculus	
Recommended Texts	1. H.K. Dass - Advanced Engineering	

	Mathematics-S Chand & Co Ltd (2007)	
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.

Semester three	Fluid Statics	ME212

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Fluid Statics			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME212**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader			**e-mail**	E-mail	
Module Leader's Acad. Title			**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	25/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**Statics I**	**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	The overall objectives of a fluid mechanics course are to give students a solid foundation in the fundamentals of fluid mechanics, problem-solving skills, practical knowledge, and a mindset for further learning and using fluid mechanics in diverse engineering situations
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The course objectives will be communicated via a variety of teaching methods. There will be PPT presentations for the chapter headings, definitions, graphs, and several helpful images, as well as a summary at the end of each chapter. The PPT provides details on brand-new subjects and unsolved examples, which will be solved on the whiteboard and shown for students to view

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	52	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects				
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Defining the unit systems
Week 2	Fluids definition and their physical properties
Week 3	Types of fluid, law of continuum
Week 4	Pressure and its applications
Week 5	Defining the absolute and gauge pressures
Week 6	Pressure variation with the elevation.
Week 7	Mid-term Exam
Week 8	Forces on immersed bodies
Week 9	Determining the resultant force acting on a submerged plane surface and the vertical and horizontal components on a curved submerged body
Week 10	Floating bodies and their instability
Week 11	Definition the buoyancy force and its application in floating bodies
Week 12	Determining the stabilities of the floating bodies by metacenter
Week 13	Accelerated Fluids: the effect of moving of fluid in constant acceleration on the pressure distribution is studied. Both linear and rotational acceleration is studied.
Week 14	Dimensional analysis: The most important dimensionless numbers are defined
Week 15	The methods of collecting multi variables in a single dimensionless relation is given
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1.Fuild Mechanics. C. Hibbeler 2.Fuild Mechanics. Frank M. WHITE 3. Fundamental of fluid mechanics. munson, okllohi	Yes
Recommended Texts		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.

Semester three	Thermodynamics I	ME213

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Thermodynamics I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME213**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Mechanical		**College**	Engineering College	
Module Leader	Ali Hussein Jabbar Al-Jubainawi		**e-mail**	alihussein.mcm@uomisan.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Scientific Committee Approval Date	3/07/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Thermodynamics II, Air Conditioning and Refrigeration	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	The module aims are: 1. To provide students with the ability to integrate the principles of classical thermodynamics and fluid mechanics in order to provide a foundation for the

أهداف المادة الدراسية	subsequent analysis of industrial plant and process equipment. 2. To ensure all students can approach thermodynamic analysis of systems in a logical and methodological manner. 3. To know the fundamentals, concepts and terminologies associated with thermodynamics. 4. To understand the laws of thermodynamics and an appreciation of their consequences. 5. To develop some elementary analysis skills using the first and second laws of thermodynamics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. To introduce the fundamentals, concepts & definitions of thermodynamic properties. 2. To clarify independent and dependent, intensive & extensive properties. 3. To know state diagram, path function, thermodynamic equilibrium and process. 4. To introduce the reversibility and irreversibility processes. 5. To know sources and forms of energy including potential energy, kinetic energy, internal energy, and flow or displacement energy. 6. To understand relationship between heat and work. 7. To understand different forms of work and power. 8. To define the concept of heat. 9. To know real gases and ideal or perfect gases. 10. To Explain the differences between Boyle's, Charle's and Gay-Lussac's laws. 11. To recognize the first law thermodynamic in term of ***NFEE*** and ***SFEE***. 12. To define the steam and two-phase system and process using steam. 13. To know the second law of thermodynamics.
Indicative Contents المحتويات الإرشادية	The main indicative contents are: - Heat, work and the system (3hr), - The state of the working fluid, reversibility and reversible work (6hr), - Conservation of energy and the non-flow equation (***NFEE)*** (6hr), - The flow energy equation (***SFEE)*** (3hr), - Liquid, vapor, gas and the use of vapor tables(9hr), - The ideal gas and specific heat (6hr), - Reversible non flow processes and reversible flow process (3hr), - Irreversible processes and non-steady flow processes (3hr), - The heat engine and the second law statements (3hr), - Entropy (3hr).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in delivering this unit are:

	1- Encourage students to participate in the exercises. This is achieved through classes and interactive educational programmers. 2- Improving and expanding critical thinking skills at the same time and by thinking about the type of simple experiments that include some sampling activities of interest to the students. 3-Raise students scientific and knowledge levels by employing the automatic technique, conversational approach, and active method.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	52	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO # 1, 2, 8,9 and 10
	Assignments	2	15% (15)	2, 12	LO # 3, 4, 6, 7 and 13
	Report	1	15% (15)	13	LO # 5, 11 and 12
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	**Chapter One: Fundamentals of thermodynamics** • Definition of terms

Week 2	**Chapter One: Fundamentals of thermodynamics** • Heat, work and the system
Week 3	**Chapter One: Fundamentals of thermodynamics** • Reversibility and reversible work
Week 4	**Chapter One: Fundamentals of thermodynamics** • The zeroth law of thermodynamics
Week 5	**Chapter Two: Energy and the first law of thermodynamics** • Non-flow energy equation
Week 6	**Chapter Two: Energy and the first law of thermodynamics** • Steady-Flow energy equation.
Week 7	**Chapter Three: Ideal gas and specific heat** • Equation of ideal gas. • Relation between specific heats. • Boyle's, Charle's and Gay-Lussac's laws.
Week 8	**Chapter Three: Ideal gas and specific heat** • Process using ideal gas. • Closed and open systems –reversible.
Week 9	**Chapter Three: Ideal gas and specific heat** • Applications of ideal gas systems
Week 10	**Chapter Four: Steam and two-phase system** • Properties of steam and liquid. • Steam table.
Week 11	**Chapter Four: Steam and two-phase system** • Process using steam.
Week 12	**Chapter Four: Steam and two-phase system** • Open System-Irreversible Process
Week 13	**Chapter Five: Second law of thermodynamics** • Heat engine and Heat pump. • Efficiency and coefficient of performance.
Week 14	**Chapter Five: Second Law of Thermodynamics** • Entropy. • Entropy and the processes.
Week 15	**Chapter Five: Second Law of Thermodynamics** • Principles of entropy increase
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Text of lectures. 2. Rajput, R.K., 2005. A textbook of engineering	Yes

	thermodynamics. Laxmi Publications. 3. Borgnakke, C. and Sonntag, R.E., 2022. Fundamentals of thermodynamics. John Wiley & Sons.	
Recommended Texts	1. Rajput, R.K., 2005. Thermal engineering. Firewall Media. 2. Khurmi, R.S. and Gupta, J.K., 2008. A textbook of thermal engineering. S. Chand Publishing.	yes

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

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

Semester three	Mechanics of Materials	ME214

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mechanics of Material**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME214**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Noor Kahim Faheed		**e-mail**	Noor.kf@uomisan.edu.iq	
Module Leader's Acad. Title	Teacher		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Strength of Materials	**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	• The main objective of the study of the mechanics of materials is to provide the engineer with the means of analyzing and designing various machines and load bearing structures. • Explain how materials react to various types of stress under a variety of conditions. • As the engineering design of different components, structures etc. used in practice are done using different kinds of materials, it is essential to understand the basic behavior of such materials
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main outcome is to make the students acquainted with the concept of load resultant, consequences and how different kinds of loadings can be withstood by different kinds of members with some specific materials.
Indicative Contents المحتويات الإرشادية	

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Chapter One: Introduction to Simple Stress and Strain** • Types of Loads • Mechanical Properties • Stress and Strain
Week 2	**Chapter One: Introduction to Simple Stress and Strain** • Direct or normal stress and Strain • Stress – Strain Curve
Week 3	**Chapter One: Introduction to Simple Stress and Strain** • Poisson's Ratio , • Shear stress • Strain Compound Bars.
Week 4	**Chapter Two: Introduction to Shear Force and Bending Moment Diagrams** • Types of Loading • Types of Support Definition • Sign Convention of Shearing Force And Bending Moment
Week 5	**Chapter Two: Introduction to Introduction to Shear Force and Bending Moment Diagrams** • Shearing Force • Bending Moment For Different Cases
Week 6	**Chapter Two: Introduction to Introduction to Shear Force and Bending Moment Diagrams** • Relationship between Shear Force (Q), Bending Moment (M) and Intensity of Loading (W).
Week 7	**Chapter Three: Introduction to Bending Stress of Beam** • Simple Theory of Bending , Neutral Axis and Section Modulus
Week 8	**Chapter Three: Introduction to Bending Stress of Beam** • Combined bending and direct stress- eccentric loading
Week 9	**Chapter Four: Introduction to Shear Stress Distribution** • Distribution of shear stress due to bending, Applications on the Different Sections.
Week 10	**Chapter Five: Introduction to Slope and Deflection of Beams** • Direct integration method (Double Integration) , Macaulay's method
Week 11	**Chapter Five: Introduction to Slope and Deflection of Beams**

	• Mohr's "Area-Moment" Method
Week 12	**Chapter Five: Introduction to Slope and Deflection of Beams** • Continuous Beams- Chaperon's "Three-Moment" Equation • Built in Beam (Fixed-Fixed).
Week 13	• Students presentations
Week 14	• Students presentations
Week 15	• Students presentations • Quiz
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Tensile Test
Week 2	Lab 2: Tensile Test
Week 3	Lab 3: Compression Test
Week 4	Lab 4: Compression Test
Week 5	Lab 5: Shear Test
Week 6	Lab 6: Shear Test
Week 7	Lab 7: Impact Test
Week 8	Lab 8: Impact Test
Week 9	Lab 9: Hardness Test
Week 10	Lab 10: Hardness Test
Week 11	Lab 11: Torsion Test
Week 12	Lab 12: Torsion Test

Week 13	Lab 13:Review
Week 14	Lab 14:Examination
Week 15	Lab 15:Final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Mechanics Of Materials I 3rd Edition • Mechanics Of Materials 6th Edition • Mechanics Of Materials 8th edition	Yes
Recommended Texts	Mechanics Of Materials 9th edition	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.

Semester three	Mechanical Drawing	ME215

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mechanical Drawing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME215**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		2	**Semester of Delivery**		1
Administering Department		Mech. Department	**College**	Engineering College	
Module Leader	Dheyaa Sabeeh AL-SAEDI		**e-mail**	Diaa.sabeeh@uomisan.edu.iq	
Module Leader's Acad. Title		Assist. Lec.	**Module Leader's Qualification**		M.Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		15/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Be educated on developing an understanding of and appreciation of Technical Drawing Industrial Society; 2. Discover and develop their talents in the fields of Technical Drawing and related technologies; 3. Develop technical problem-solving skills in Technical Drawing as related to materials an processes; 4. Develop the correct and accepted Technical Drawing skills as demanded by Industry; 5. Be aware of the career opportunities available in Technical Drawing and its related fields; 6. have a working knowledge and understanding of Computer Aided Drafting applications; 7. Develop skills to use drawing in the process of design.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. Get information about the important tools for engineering drawing. This will give student basic knowledge of technical drawings professions and means of communications to others. 2. Learning how to draw the shapes, angels and lines and others which is essential for engineer. 3. Develop student's imagination and ability to represent the shape size and specifications of physical objects. 4. Understand the main idea of using dimension for engineering drawing 5. Familiarize with different drawing equipment, technical standards and procedures for construction of geometric figures. This will give students ability to draw three dimension objects on the paper and to draw the pictorial drawings. 6. Explain the principle of projection and sectioning 8. Understand the intersection, development of surface of body and fasteners 9. Learning the main idea from assembly and detail drawing
Indicative Contents المحتويات الإرشادية	The main indicative contents are: 1. Introduction - General Revision Types of lines, projection, sections, dimensions by hand and using AutoCAD software. 2. Methods of attaching and fixing mechanical parts: 2-1: Non-permanent attachment and fixation: A. Types of bolts and studs, and their proportion, uses. B. Different types of locking devices and their specification. C. Different types of foundation bolts. D. keys, cotters and pins with BIS conventions.

	E. Different types of pins. 2-2: Permanent bonding and fixation A. Description of Riveted joints. B. Welded Joints and their representation (Actual and Symbolic) on drawing as per BIS. 3. Working drawing of gears such as spur gears. 4. Working drawing of springs such as compression spring. 5. Limits, fit, tolerance. Dimensional tolerance, geometrical tolerance. 6. Symbols for machining and surface finishes (grades and micron values) 7. Sketching & Assembly Drawing of machine vice. 8. Numbering and preservation of drawing. 9. Disassembly Drawings. 10. Introduction to CAD, Advantages of using CAD, Relative Co-ordinate System Knowledge of Workspace in drawing space: 2D classic, Drafting & annotation, 3D modeling, etc. Use of drawing utilities, Snap, Ortho, Grid, Osnap, Polar tracking. Customization of working environment with tool using shortcut key, menu driven or ribbon setting

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in delivering this unit are: 1- Encourage students to participate in the exercises. This is achieved through classes and interactive educational programmers. 2- Improving and expanding critical thinking skills at the same time and by thinking about the type of simple physical example (prototypes) that include some sampling activities of interest to the students. 3-Raise students scientific and knowledge levels by employing the technique, conversational approach, and active method.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO # 1, 2, 8,9 and 10
	Assignments/ classwork	15	10% (15)	Continuous	All
	Assignments/ Homework	15	10% (15)	Continuous	All
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 للمختبر

	Material Covered
Week 1	• Introduction - General Revision Types of lines, projection, sections, dimensions by used hand and AutoCAD software.
Week 2	• Bolts and Bolted joints Type of Bolts and Nuts, Assembly Drawing for Bolting System
Week 3	• Keys and Keyways joints, Types of Keys and their uses Assembly Drawing for Keys System
Week 4	• Welding joints, Welding symbols, Assembly Drawing for Welding System indicated the Welding symbols.
Week 5	• Rivets and Riveted joints, Types of Rivets and Rivets joints, • **QUIZ**
Week 6	• Assembly Drawing for Rivets System
Week 7	**Mid – Term Exam**
Week 8	• Springs, Types of Springs and their uses

Week 9	• Assembly Drawing for Compressed Spring
Week 10	• Assembly Drawing. • **QUIZ**
Week 11	• Types of Gears, Spur Gear definitions, Drawing Spur Gear, and Assembly Drawing for Spur Gear box System.
Week 12	• Principle of Tolerances
Week 13	• Principle of Fits
Week 14	• Assembly Drawing
Week 15	• Disassembly drawing.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Systematic engineering drawing book , author Jaafar Al-Khafaf كتاب الرسم الهندسي المنهجي, للمؤلف عبد الرسول الخفاف	Yes
Recommended Texts	Machine Drawing - Narayana K Boundy, A.w. (Albert William). Engineering drawing. 3rd ed Textbook of Engineering Drawing Second Edition K. Venkata Reddy	NO
Websites	AutoCAD Training Exercises for Beginners-yotube AutoCAD-Mechanical drawing problems -youtube	

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.

Semester three	Programming of Computers	ME216

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Programming of Computers**		**Module Delivery**	
Module Type	**B**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME216**			
ECTS Credits	**6**			
SWL (hr/sem)	**150**			
Module Level	2	**Semester of Delivery**	3	
Administering Department	Mech. Department	**College**	Engineering College	
Module Leader	Mahmood Shacker Mamood	**e-mail**	mahmood-shacker @uomisan.edu.iq	
Module Leader's Acad. Title	PhD	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Iman Mohammed Ismael	**e-mail**	eman.mohamed@uomisan.edu.iq	
Peer Reviewer Name	Name	**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023	**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	The course provides a gentle introduction to the MATLAB computing environment, and is intended for beginning users and those looking for a review. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The course consists of interactive lectures and sample MATLAB problems given as assignments and discussed in class. No prior programming experience or knowledge of MATLAB is assumed. Concepts covered include basic use, graphical representations and tips for designing and implementing MATLAB code.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarify the basic concepts of programming in MATLAB language through a set of programming instructions. 2. Gain skills in handling programming problems and issues. 3. Acquiring basic skills as an introduction to building large and applied programs. 4. Gain a basic understanding of how programmed systems work in various industrial applications. 5.Ability to program and design application programs. 6. The ability to think about addressing a particular problem or issue. 7. Writing scientific reports. 8.The ability to gain experience in dealing with programmed systems.

Indicative Contents المحتويات الإرشادية	1. Readings, self-learning, panel discussions. 2. Exercises and activities in the lecture. 3. Homework. 4. Directing students to some websites to benefit and develop capabilities. 5. Conducting seminars to explain and analyze a specific issue and find solutions to it.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Explanation and clarification through lectures. The method of displaying scientific materials on display devices: data show, smart boards, and plasma screens.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	All
	Assignments	2	10% (10)	2, 12	All
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	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 Matlab language and writing symbols with use it
Week 2	Types of constants , variables and arithmetic sentences.
Week 3	Write a simple matrix and how to address it to find any element in it.
Week 4	Write a regular matrices and how to address it to find any element in it.
Week 5	Standard matrices unit, zeroes and eye matrices.
Week 6	Operations on arrays
Week 7	Arithmetic operations between a matrix and a singular number or between matrices.
Week 8	Searching for a partial matrix and using prompts to find the sum of the elements of the matrix or the largest or smallest element in it.
Week 9	Perform and evaluate relational and logical operations.
Week 10	Comparative and logical operators If-else-end form switch-case-otherwise form.

Week 11	Rotation and repetition statements.
Week 12	Formula for storing variables and for loading them from a file.
Week 13	Dealing with files
Week 14	Instructing plot and partial graphs
Week 15	Great function that deal with one or with several variables with input and one variable with output.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1-2	Lab 1: Steps to create, compile and implement a program using Matlab languge.
Week 3-4	Lab 2: Implement programs for Array (one and two dimensions)
Week 5-6	Lab 3: Implement programs for conditional statements (if-statement)
Week 7-8	Lab 4: Implement programs for conditional statements (switch-statement)
Week 9-10	Lab 5: Implement programs for Loop statements (for-statement)
Week 11-12	Lab 6: Implement programs for plot and partial graphs
Week 13-14	Lab 7: Solving differential equations
Week 15	Lab 8: Implement programs for plot 2D&3D

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts	تعليم البرمجة بلغة ماتلاب بالأمثلة الشاملة	yes
Websites	http://www.mathworks.in/matlabcentral/	

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.

Semester four

Semester four	Engineering Mathematics II	E221

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mathematics II**			**Module Delivery**	
Module Type				☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E221**				
ECTS Credits	**5**				
SWL (hr/sem)	**63**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Ali AL-MALIKI		**e-mail**	ali.al-maliki@uomisan.edu.iq	
Module Leader's Acad. Title	Teacher Assistant		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Engineering Mathematics 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. Be educated on Mathematics methods. 2. Know the procedure of calculations. 3. Develop students understanding of useful Mathematics methods in engineering calculations. 4. Studying and solve applications using Mathematics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main outcome is a student have the knowledge of useful mathematics methods makes him deal with the problems, applications and calculations in different branches of science in mechanical engineering
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 examples and exercises, while at the same time refining and expanding their logical thinking skills. This will be achieved through classes,

	interactive tutorials and by considering solving of simple applications.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	3, 5, 10	All
	Assignments	2	10% (10)	4, 12	All
	Homework	2	10% (10)	2, 9	All
Summative assessment	**Midterm Exam**	2 hr	15% (15)	8	All
	Final Exam	3 hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Chapter One: DIFFERENTIAL EQUATIONS** • Fundamental Definitions • Solutions of First Order : variable separable • Solutions of First Order : exact
Week 2	**Chapter One: DIFFERENTIAL EQUATIONS** • Solutions of First Order : linear • Solutions of First Order : Bernoulli
Week 3	**Chapter One: DIFFERENTIAL EQUATIONS** • Solutions of second and Higher Order: Linear equation with constant coefficients, linear homogeneous equations with constant coefficients • Quiz.
Week 4	**Chapter One: DIFFERENTIAL EQUATIONS** • nonhomogeneous equations, solving of non-homogenous equations, variation of parameters • Assignment
Week 5	**Chapter One: DIFFERENTIAL EQUATIONS** • higher order linear equations with constant coefficients, D-operator, Cauchy equation. • Quiz.
Week 6	**Chapter Two: LAPLACE TRANSFORMATION** • Laplace Transformation Definition • Basic Properties of The Laplace Transformation
Week 7	**Chapter Two: LAPLACE TRANSFORMATION** • The Laplace Transformation of Elementary Functions
Week 8	**Chapter two: LAPLACE TRANSFORMATION**

	• The Laplace Transform of e^{at} f (t), The Laplace Transform of t^n f (t) • Midterm Exam
Week 9	**Chapter Two: LAPLACE TRANSFORMATION** • Inverse Laplace transforms
Week 10	**Chapter Two: LAPLACE TRANSFORMATION** • The Solution of Differential Equations Using Laplace Transforms • Quiz.
Week 11	**Chapter Three: INFINITE SEQUENCES AND SERIES** • Introduction, Convergence and Divergence Test
Week 12	**Chapter Three: INFINITE SEQUENCES AND SERIES** • Geometric Series and Partial Sum • Assignment
Week 13	**Chapter Three: INFINITE SEQUENCES AND SERIES** • Integral, Comparison, Ratio and Root Tests
Week 14	**Chapter Three: INFINITE SEQUENCES AND SERIES** • Alternating series, Power Series
Week 15	**Chapter Three: INFINITE SEQUENCES AND SERIES** • Taylor and Maclaurin Series, Applications of Power Series
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	George B. Thomas, Maurice D. Weir, Joel Hass, Frank R. Giordano - Thomas's calculus	
Recommended Texts	1. H.K. Dass - Advanced Engineering Mathematics-S Chand & Co Ltd (2007)	

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.

Semester four	Fluid Dynamics	ME222

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Fluid Dynamics			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME222**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Mechanical Engineering		**College**	College of Engineering	
Module Leader	Dr. Sabah F. H. Alhamdi		**e-mail**	E-mail: sabahalhamdi@uomisan.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ass. Lec. Huda Radhi Jabar		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	25/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**Fluid Statics**	**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	The overall objectives of dynamics fluid mechanics course are to give students a solid foundation in the fundamentals of Dynamics fluid mechanics, problem-solving skills, practical knowledge, and a mindset for further learning and using fluid mechanics in diverse engineering situations
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The course objectives will be communicated via a variety of teaching methods. There will be PPT presentations for the chapter headings, definitions, graphs, and several helpful images, as well as a summary at the end of each chapter. The PPT provides details on brand-new subjects and unsolved examples, which will be solved on the whiteboard and shown for students to view

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects				
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Fundamental of Flow & Kinematics: Basic definitions of the parameters and terms that govern the flow of fluid are given in this section, such as; acceleration field, rotational an irrotational, etc.**
Week 2	**Fundamental of Flow & Kinematics: Basic definitions of the parameters and terms that govern the flow of fluid are given in this section, such as; Circulation, Flow lines: pathline, streamline, streakline. Flow visualization etc.**
Week 3	**Control Volume Relation for Fluid Analysis: The definition of control volume and basic derivatives of the equations of conservations (conservation of mass and momentum).**
Week 4	**Control Volume Relation for Fluid Analysis: The definition of control volume and basic derivatives of the equations of Energy (conservation of energy), Euler, and Bernoulli equations.**
Week 5	**Control Volume Relation for Fluid Analysis: Applications of Bernoulli equations and applications of momentum equation of stationary and moving blades.**
Week 6	**Control Volume Relation for Fluid Analysis: More applications of momentum equation of stationary and moving blades.**
Week 7	**Viscous Internal Flow: Laminar and turbulent fully developed flow between parallel plates and inside pipes.**
Week 8	**Viscous Internal Flow: Friction factor and its relations with Reynolds number (in laminar flow) and with pipe roughness in addition.**
Week 9	**Viscous Internal Flow: Darcy Weizbach relation is explained and used to calculate the friction factor (Major Losses).**
Week 10	**Viscous Internal Flow: Minor losses, in fittings such as valves, reduces, expanders, filters, elbows are studied and have to be included in the determination of the overall losses.**
Week 11	**Viscous Internal Flow: More on Minor losses, in fittings such as valves, reduces, expanders, filters, elbows are studied and have to be included in the determination of the overall losses. Multi pipes systems are analyzed.**
Week 12	**Boundary Layer: The definition of boundary layer flow, boundary layer thickness, displacement thickness, and momentum thickness.**

Week 13	**Boundary Layer: Laminar and turbulent boundary layer over a flat plate, Von Karman theory.**
Week 14	**Flow Measurements: Meters like, Electromagnetic flow meter, ultrasonic flow meter, hotwire flow meter, etc.**
Week 15	**Flow Measurements: The principles of the differential pressure flow meters. Other types of flow**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Fluid properties.
Week 2	Dead weight calibrated.
Week 3	Manometers.
Week 4	Visualization of the flow in the channels.
Week 5	Visualization of the flow in the channels.
Week 6	Pitot static tube.
Week 7	Pitot static tube.
Week 8	Bernoulli´s Theorem Demonstration.
Week 9	Bernoulli´s Theorem Demonstration.
Week 10	Reynolds number.
Week 11	Reynolds number.

Week 12	Flow meter measurement.
Week 13	Flow meter measurement.
Week 14	Wears.
Week 15	Wears.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1.Fuild Mechanics. C. Hibbeler 2.Fuild Mechanics. Frank M. WHITE 3. Fundamental of fluid mechanics. munson, okllohi	Yes
Recommended Texts	Manual for Lab.	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.

Semester four	Thermodynamics II	ME223

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Thermodynamics II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME223**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Ali Hussein Jabbar Al-Jubainawi		**e-mail**	alihussein.mcm@uomisan.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	4/07/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	- Thermodynamics I - Air Conditioning and Refrigeration	**Semester**	1 2

Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The module aims are: 6. To provide students with the ability to integrate the principles of classical thermodynamics and fluid mechanics in order to provide a foundation for the subsequent analysis of industrial plant and process equipment. 7. To ensure all students can approach thermodynamic analysis of systems in a logical and methodological manner. 8. To understand the laws of thermodynamics and an appreciation of their consequences. 9. To develop some elementary analysis skills using the second laws of thermodynamics. 10. To deeply know the thermal engineering systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. To introduce the fundamentals of heat engine. 2. To review the basic concepts of thermodynamics. 3. To use the thermodynamic relations, graphs and tables to calculate the various state entities. 4. To explain how the most common thermodynamic machines work, such as Otto, Diesel, Clausius-Rankine and Brayton. 5. To explain the principles of steam cycle process (Clausius-Rankine), gas turbine process (Brayton) and the internal combustion engine (Otto and Diesel) and solve problems related to these processes and principles applied to increase efficiency. 6. To determine the coefficient of performance of refrigerators and heat pumps and compare with refrigerators and heat pumps operating on the reversed Carnot cycle. 7. To plot processes on both P-V and T-S diagrams. 8. To analyze systems Air Conditioning processes through the application of the laws of thermodynamics. 9. To apply both the first and second laws to determine heat transfer, work, and property changes during processes occurring in both closed and open systems.

	10. To explain the behavior of gas mixtures in thermodynamic system.
Indicative Contents المحتويات الإرشادية	The main indicative contents are: The heat engine cycle (6hr), Air sundered cycle (9hr), Reversed Carnot cycle (6hr), Steam power plant (6hr), Positive displacement compressors (9hr), Gas mixture (9hr),

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in delivering this unit are: 1- Encourage students to participate in the exercises. This is achieved through classes and interactive educational programmers. 2- Improving and expanding critical thinking skills at the same time and by thinking about the type of simple experiments that include some sampling activities of interest to the students. 3-Raise students scientific and knowledge levels by employing the automatic technique, conversational approach, and active method.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem)	57	**Unstructured SWL (h/w)**	4

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

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO # 1, 2, 8,9 and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6, 7 and 13
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 11 and 12
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	**Chapter One: The heat engine cycle** • The heat engine cycle - Carnot cycle and perfect gas.
Week 2	**Chapter One: The heat engine cycle** • The heat engine cycle – Brayton's cycle.
Week 3	**Chapter Two: Air sundered cycle** • Air sundered cycle – Otto cycle.

Week 4	**Chapter Two: Air sundered cycle** • Air sundered cycle – Diesel cycle.
Week 5	**Chapter Two: Air sundered cycle** • Air sundered cycle – Dual combustion cycle.
Week 6	**Chapter Three: Reversed Carnot cycle** • Air refrigerator working on reversed Carnot cycle.
Week 7	**Chapter Three: Reversed Carnot cycle** • Refrigeration Cycles.
Week 8	**Chapter Four: Steam power plant** • The simple Rankin cycle.
Week 9	**Chapter Four: Steam power plant** • Rankin cycle with superheat
Week 10	**Chapter Five: Positive displacement compressors** • Reciprocating machines.
Week 11	**Chapter Five: Positive displacement compressors** • The conditions for minimum work, isothermal efficiency and volumetric efficiency.
Week 12	**Chapter Five: Positive displacement compressors** • Multi-stage compression.
Week 13	**Chapter Six: Gas mixture** • Dalton's law, Gibs Dalton law and volumetric analysis of a gas mixture
Week 14	**Chapter Six: Gas mixture** • Molecular weight, gas constant and specific heats of gas mixture
Week 15	**Chapter Six: Gas mixture** • Adiabatic mixing of gas mixture
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Know to the different measurement instruments.

Week 2	Lab 2: Know to the different measurement instruments.
Week 3	Lab 3: Determination of specific heat capacity of liquids
Week 4	Lab 4: Determination of specific heat capacity of liquids
Week 5	Lab 5: Determination of specific heat capacity of solids
Week 6	Lab 6: Determination of specific heat capacity of solids.
Week 7	Lab 7: Experimental investigation of Boyle's Law and atmospheric pressure.
Week 8	Lab 8: Experimental investigation of Boyle's Law and atmospheric pressure.
Week 9	Lab 9: Coefficient of linear expansion of metals.
Week 10	Lab 10: Coefficient of linear expansion of metals.
Week 11	Lab 11: Thermocouple Voltages
Week 12	Lab 12: Thermocouple Voltages
Week 13	Lab 13:Review
Week 14	Lab 14:Examination
Week 15	Lab 15:Final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	4. Text of lectures. 5. Rajput, R.K., 2005. A textbook of engineering thermodynamics. Laxmi Publications. 6. Borgnakke, C. and Sonntag, R.E., 2022. Fundamentals of thermodynamics. John Wiley & Sons.	Yes
Recommended Texts	3. Rajput, R.K., 2005. Thermal engineering. Firewall Media. 4. Khurmi, R.S. and Gupta, J.K., 2008. A textbook of	yes

	thermal engineering. S. Chand Publishing.	
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.

Semester four	Strength of Materials	ME224

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Strength of Materials**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME224**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Noor Kadhim Faheed		**e-mail**	Noor.kf@uomisan.edu.iq	
Module Leader's Acad. Title	Teacher		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mechanics of Materials	**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	• As the engineering design of different components, structures etc. used in practice are done using different kinds of materials, it is essential to understand the basic behavior of such materials
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Lectures series on Strength of Materials are prepared, explaining the fundamentals in a simple and lucid manner so that the students can grasp the basics of the application of loading system and its consequence in a deformable body.
Indicative Contents المحتويات الإرشادية	

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	**Chapter One: Introduction to Torsion** • Simple torsion theory • Polar Second Moment of Area • Polar Section Modulus Composite Shafts
Week 2	**Chapter One: Introduction to Torsion** • Combined Stress Systems • Combined Bending and Torsion • Combined Bending
Week 3	**Chapter One: Introduction to Torsion** • Torsion and Direct Thrust • Shafts With Bolt Coupling • Torsion of Non-Circular
Week 4	**Chapter Two: Introduction to Stress and Strain Analysis** • Stress Analysis, • Stresses on Oblique Planes • Direct Stress • quiz
Week 5	**Chapter Two: Introduction to Stress and Strain Analysis** • Material subjected to pure shear • Material subjected to two mutually perpendicular direct stresses • Material subjected to combined direct and shear stresses • quiz
Week 6	**Chapter Two: Introduction to Stress and Strain Analysis** • Principal plane inclination in terms of the associated principal stress • Graphical solution - Mohr's stress circle Strain Analysis • Linear strain for bi- and tri-axial stress state
Week 7	**Chapter Three: Introduction to Stress and Strain Analysis** • Average temperature • Laminar and turbulent flow in tubes
Week 8	**Chapter Three: Introduction to Stress and Strain Analysis** • Principal strains in terms of stresses , Bulk modulus K And Volumetric strain , Relationship between the elastic constants E, G, K and v • Strains on an oblique plane (direct and shear)
Week 9	**Chapter Three: Introduction to Stress and Strain Analysis** • Principal strain- Mohr's strain circle • Relationship between Mohr's stress and strain circles • quiz
Week 10	**Chapter Four: Introduction to Strain energy**

	• Strain energy for different kind of loading • suddenly applied loads • Quiz.
Week 11	**Chapter Four: Introduction to Strain Energy** • Castigliano's first theorem for deflection.
Week 12	**Chapter Four: Introduction to Thin Cylinder** • Thin cylinders under internal pressure • Hoop or circumferential stress • Longitudinal stress • Changes in dimensions
Week 13	**Chapter Five: Introduction to Thin Cylinder** • Thin spherical shell under internal pressure • Change in internal volume • Vessels subjected to fluid pressure • Cylindrical vessel with hemispherical ends • Wire-wound thin cylinders
Week 14	**Chapter Five: Introduction to Thick Cylinders** • Development of the Lam6 theory • Thick cylinder - internal pressure only , • Longitudinal stress • Change of cylinder dimensions • Compound cylinders.
Week 15	**Chapter Five: Introduction to Struts** • Euler's theory • Euler "validity limit" • Rankine or Rankine-Gordon formula.
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	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	• Strength of Materials 3rd Edition. • Mechanics of Materials, Ninth Edition, 2014, Published by Pearson Prentice Hall R.C. Hibbeler	Yes
Recommended Texts	• Mechanics of Materials, Seventh Edition, 2015 Published by McGraw-Hill Education • Ferdinand P. Beer • E. Russell Johnston, Jr. • John T. DeWolf	No

	• David F. Mazurek	
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.

Semester four	Engineering Metallurgy	ME225

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Metallurgy II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME 234**				
ECTS Credits	**6**				
SWL (hr/sem)	**108**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Ali Husien Hasan		**e-mail**	al-azzawwi@uomisan.edu.iq	
Module Leader's Acad. Title	Instructor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	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	After taking this module the student will be able: 1. To recognize the Mechanical properties of metals and alloys. 2. To learn the thermal equilibrium diagrams. 3. Learn about plain carbon steel and its heat treatment. 4. The types of alloy steels. 5. Understand the cast iron and non-ferrous metals and alloys. 6. Understand the polymers and their properties. 7. The corrosion types, mechanism, and damage.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The outcome of this module is graduate a mechanical engineer can deal with different types of steels, non-ferrous materials and polymers in addition to their mechanical properties. The corrosion types and its mechanism and damage are also what the engineer should know about.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Giving sufficient information about the engineering materials and their use and mechanical properties. Polymers as important materials should the student know about them. Finally, the mechanism of corrosion damage initiation also the students should have the basic information about it.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Chapter One: Structure of Materials.** • Atomic, bonding and crystallographic structure. • Macro and Micro structure of ingots and castings.
Week 2	**Chapter Two: Mechanical properties and plastic deformation.** • Tension and Hardness tests. • Elastic and Plastic Deformation.
Week 3	**Chapter Two: Mechanical properties and plastic deformation.** • Dislocation theory of ship. • Deformation by twin • Cold working and its effect. • Hot working.
Week 4	**Chapter Three: Alloys and Thermal Equilibrium Diagrams (TEDs).** • Strengthen by alloying. • Solid solution. • Intermetallic compounds. • Eutectic and Eutictoid.
Week 5	**Chapter Three: Alloys and Thermal Equilibrium Diagrams (TEDs)..** • Types of Thermal Equilibrium Diagrams • Solid solution type, combination type, peritectic type and intermetallic compound type. • Quiz
Week 6	**Chapter Four: Plain Carbon Steel (PCS).** • Steel making and mechanical properties of Plain Carbon Steel. • Structure of Plain Carbon Steel (PCS). • The steel portion of the iron-Carbon Diagram.
Week 7	**Chapter Four: Plain Carbon Steel (PCS).** • Effect of other elements present in PCS. • Classification and use of PCS. • The complete Iron-Carbon Diagram.
Week 8	**Chapter Five: Heat Treatment of Plain Carbon Steel.** • Annealing (process annealing, and Full annealing. • Spheroi-disation. And Normalizing. • Hardenability, the end quench test of hardenability.

	• Tempering
Week 9	**Chapter Five: Heat Treatment of Plain Carbon Steel.** • The isothermal transformation of austenite. • Mart-tempering. • Austempering..
Week 10	**Chapter Six: Alloy Steels.** • Effect of alloying elements. • Manganese steels. • Nickel steels. • Chromium steels. • Low alloy Nickel-Chromium steels. • Quiz.
Week 11	**Chapter Six: Alloy Steels.** • Silicon steels. • Stainless steels. • Heat resisting steels. • High speed tool steels. • Magnetic alloys.
Week 12	**Chapter Seven: Cast Iron.** • White and Grey cast irons. • Structure of grey cast iron. • Malleable cast iron. • Inoculated high duty cast iron. • Spheroidal graphite cast iron. • Alloy cast irons. • Heat treatment of cast iron.
Week 13	**Chapter Eight: Non-ferrous metals and alloys.** • Cupper and Cupper alloys. • Aluminum and Aluminum alloys. • Zinc and its alloys.
Week 14	**Chapter Nine: Polymers** • Polymer characterization. • Synthetic and properties of polymers. • Polymer blends and composites. • Polymer processing and testing.
Week 15	**Chapter Ten: Corrosion.** • Corrosion types and mechanisms. • Corrosion damage.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab. 1: Introduction to Lab and equipment.
Week 2	Lab. 2: Preparing samples for microscopic investigation (cutting, mounting, grinding, and polishing).
Week 3	Lab. 3: Microscopic Testing different steel microstructures.
Week 4	Lab. 4: Preparing Samples for tensile and torsional tests.
Week 5	Lab. 5 Microscopic Investigation of alloy microstructure.
Week 6	Lab. 6 Tensile Test and mechanical properties.
Week 7	Lab. 7 Investigation the effect of heat treatment on the material microstructure.
Week 8	Lab 8: Torsional Test of materials.
Week 9	Lab 4: Vickers and Rockwell Hardness measurements for different materials. .
Week 10	Lab 5: Brinell Hardness and relations between hardness measurements.
Week 11	Lab 6: Longitudinal Thermal Expansion of different materials.
Week 12	Lab 12: Microscopic Investigation of Cast Irons.
Week 13	Lab 13: Review.
Week 14	Lab 14: Preparing for Examination.
Week 15	Lab 15: Final examination.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Physical Metallurgy Principles, by Reza Abbaschian, Robert E. Reed-Hill, and Richard E. Smallman	Yes
Recommended Texts	1. Introduction to the Physical Metallurgy of Welding by Sidney H. Avner. 2. ASM Handbooks: The American Society for Metals (ASM) publishes a series of authoritative handbooks on various aspects of materials science and engineering.	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.

Semester four	Democracy and Human Rights	U226

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Human Rights and Democracy**		**Module Delivery**
Module Type	**Core .1**		• ☒ **Theory** • ☒ **Lecture** • ☐ **Lab** • ☐ **Tutorial** • ☐ **Practical** • ☐ **Seminar**
Module Code	**U218**		
ECTS Credits	3 **.2**		
SWL (hr/sem)	75 **.3**		
Module Level	Gx11 2	**Semester of Delivery**	1
Administering Department	Mechanical Engineering	**College**	College of Engineering
Module Leader	Dr. Sabah F. H. Alhamdi	**e-mail**	E-mail: sabahalhamdi@uomisan.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Jaber	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	25/06/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**None**	**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	The overall objectives of Human Rights and Democracy course are to give students a solid foundation in the fundamentals of Human Rights and Democracy, problem-solving skills, practical knowledge, and a mindset for further learning and using Human Rights and Democracy in diverse community habits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The course objectives will be communicated via a variety of teaching methods. There will be PPT presentations for the chapter headings, definitions, and several helpful images, as well as a summary at the end of each chapter. The PPT provides details on brand-new subjects and unsolved examples, which will

	be solved on the whiteboard and shown for students to view

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	35	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	1
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	40	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	1
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب خلال الفصل**	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects				
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fundamental of freedom
Week 2	.1 Intellectual freedom and cultural
Week 3	.2 Freedom of politics, Economic and Social freedom
Week 4	.3 Freedom of politics, Economic and Social freedom
Week 5	.4 The future of public freedoms
Week 6	.5 Universal Declaration of Human Rights and Freedoms
Week 7	.6 Universal Declaration of Human Rights and Freedoms
Week 8	.7 Freedom in Islam
Week 9	.8 A brief explanation of the types of democracy
Week 10	Democracy and the entrance to it.
Week 11	Applications of democracy.
Week 12	.4 Administrative and financial corruption
Week 13	.5 Administrative and financial corruption
Week 14	Democracy in Islam
Week 15	Preparatory before the final Exam
Week 16	More preparatory 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	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. **Human Rights and Democracy**	Yes
Recommended Texts		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.

Semester five

Semester five	Engineering Analysis	E311

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Engineering Analysis**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E311**			
ECTS Credits	**5**			
SWL (hr/sem)	**63**			
Module Level	3	**Semester of Delivery**	1	
Administering Department	Mech. Department	**College**	Engineering College	
Module Leader	Mohammad Mahdie Saleh Al-Azawii	**e-mail**	Mohammed.alazawii@uomisan.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)	**e-mail**	E-mail	
Peer Reviewer Name	Name	**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	**E111, E121, E211, and E221**	**Semester**	1 and 2 of level 1 and 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. Apply complex variable techniques to solve engineering problems, including complex integration and conformal mappings. 2. Understand the properties and applications of special functions (Gamma function). 3. Understand the concept and properties of Fourier series representation. 4. Apply Fourier series to analyze periodic functions and solve engineering problems involving periodic phenomena. 5. Explore the properties and applications of odd and even functions. 6. Apply half-range series to analyze and approximate even and odd functions. 7. Understand the concept of complex Fourier series and its applications. 8. Apply half-range expansion to analyze and approximate complex periodic functions. 9. Gain knowledge of Fourier integration techniques and their applications in solving differential equations. 10. Understand the concept and properties of Laplace transformation. 11. Gain proficiency in Laplace transformation techniques and their applications in solving initial value problems of ordinary differential equations (ODEs). 12. Understand and solve ordinary differential equations using Laplace transform and D-operator. 13. Develop an understanding of Bessel functions and Legendre functions.

	14. Develop an understanding of partial differential equations and their classifications. 15. Apply partial differential equations to model and solve engineering problems. 16. Study the characteristics and solve the wave partial differential equations by separation of variables. 17. Understand the characteristics and solve heat partial differential equations by separation of variables. 18. Understand the probability and statistics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing this module, student should be able to: 1- Analyze and solve engineering problems using complex variable techniques, including complex integration and conformal mappings. 2- Understand and apply special functions, such as Gamma, function, to solve mathematical and engineering problems effectively. 3- Analyze and solve engineering problems using Fourier series, understanding the representation and properties of periodic functions and their applications in engineering. 4- Apply concepts of odd, even functions, and half-range series to approximate and analyze engineering problems involving even functions. 5- Utilize complex Fourier series and half-range expansion to analyze and approximate complex periodic functions encountered in engineering. 6- Utilize Laplace transformation methods to solve ordinary differential equations (ODEs), including initial value problems, and interpret the results in engineering contexts. 7- Analyze and solve engineering problems involving partial differential equations, understanding their classifications and selecting appropriate solution techniques. 8- Apply solutions of wave partial differential equations to analyze and model wave phenomena encountered in engineering systems. 9- Apply solutions of heat partial differential equations to analyze and model heat transfer phenomena in engineering systems.
Indicative Contents	**1. Complex Variables and Functions:**

المحتويات الإرشادية	Complex Functions, Special Complex Functions, Continuity and Differentiation, Cauchy-Riemann Equations, Complex Integration, Contour Integration, Conformal Mapping **2. Fourier Series and Integral:** Fourier Series, Sine and Cosine Fourier Series, Complex Fourier Series, Odd and Even Functions and Half Range Expansion, Fourier Integral. **3. Laplace Transform:** Laplace Transform, Laplace Transform of Derivatives and Integrals, Laplace Transform of Special Functions, Inverse Laplace Transform. **4. Solution of Ordinary Differential Equations:** Ordinary Differential Equations, Solution of ODE using Laplace Transform, Solution of Ordinary Differential Equations using D-Operator Bessel Functions, Legendre Functions. **5. Partial Differential Equations:** Partial Differential Equation, D-Alembert Solution of the 1-Dim Wave Equation, Using Separation of Variables to Solve PDE, Solution of 1Dim Diffuse Equation. **6. Probability and Statistics:** Statistics and Statistical Variables, Permutations and Combinations, Probability and Distribution

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module of Numerical Analysis will adopt an interactive

	learning approach to actively engage students and enhance their critical thinking skills. The main strategy is to encourage student participation through classes, and interactive tutorials. Students will have the opportunity to actively contribute to exercises and discussions, allowing for a deeper understanding of the subject matter. Overall, these learning and teaching strategies are designed to create an engaging learning environment that fosters active participation, critical thinking, and a comprehensive understanding of the concepts covered in the module.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	20% (20)	3, 6, 8, 11 and 13	All
	Assignments	2	10% (10)	4, 10	All

	Projects / Lab.	NA	NA	NA	All
	Report	1	10% (10)	15	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Chapter One: Complex Variables and Functions** • Complex Functions, Continuity and Differentiation, Cauchy-Riemann Equations, and Complex Integration
Week 2	**Chapter One: Complex Variables and Functions** • Complex Functions, Gamma function
Week 3	**Chapter One: Complex Variables and Functions** • Contour Integration, Conformal Mapping • Quiz
Week 4	**Chapter Two: Fourier Series and Integral** • Fourier Series, Sine and Cosine Fourier Series
Week 5	**Chapter Two: Fourier Series and Integral** • Complex Fourier Series, Odd and Even Functions and Half Range Expansion
Week 6	**Chapter Two: Fourier Series and Integral** • Fourier Integral • Quiz
Week 7	**Chapter Three: Laplace Transform** • Laplace Transform, Laplace Transform of Derivatives and Integrals
Week 8	**Chapter Three: Laplace Transform** • Laplace Transform of Special Functions, Inverse Laplace Transform • Quiz
Week 9	**Chapter Four: Solution of Ordinary Differential Equations**

	• Ordinary Differential Equations, Solution of ODE using Laplace Transform
Week 10	**Chapter Four: Solution of Ordinary Differential Equations** • Solution of Ordinary Differential Equations using D-Operator
Week 11	**Chapter Four: Solution of Ordinary Differential Equations** • Bessel Functions and Legendre Functions • Quiz
Week 12	**Chapter Five: Partial Differential Equations** • . Partial Differential Equation, D-Alembert Solution of the 1-Dim Wave Equation,
Week 13	**Chapter Five: Partial Differential Equations** • Using Separation of Variables to Solve PDE, Solution of 1-Dim Diffuse Equation • Quiz
Week 14	**Chapter Six: Probability and Statistics** • Statistics and Statistical Variables,
Week 15	**Chapter Six: Probability and Statistics** • Permutations and Combinations, Probability and Distribution
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week	NA

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Advanced Engineering Mathematics, 10th edition by Kreyszig, E. Wiley 2011	Yes

Recommended Texts	1- Advanced Engineering Mathematics, by H.K. Dass, 2018, S. Chand Publishing	Yes
Websites	Advanced Engineering Mathematics - YouTube	

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.

Semester five	Heat Transfer I	ME312

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Heat Transfer I**		**Module Delivery**		
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**		
Module Code	**ME312**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Ahmed Kadhim Alshara		**e-mail**	dr.ahmed_alshara@uomisan.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Murtadha Saeed Mohammed		**e-mail**	murtadha.saeed@uomisan.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/06/2023		**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 module aims are: 1. Be educated on heat transfer methods. 2. Know the laws of heat transfer and their calculations. 3. Develop your understanding of heat transfer system thermal load calculations. 4. Identify the relationships that were examined. 5. Studying the applications of heat transfer 6. Identify the most important design parameters for heat transfer applications and systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. List methods of heat transfer. 2. Identify how heat is transferred. 3. Recognize the steady state heat conduction in plane. 4. Recognize the steady state heat conduction in radial bodies. 5. Define the overall heat transfer coefficient. 6. Describe the heat source systems. 7. Discuss and analyze the extended surfaces. 8. Define the thermal contact resistance. 9. Discuss lumped heat-capacity system. 10. Explain the transient heat flow in semi-Infinite solid. 11. Identify physical mechanism and properties of radiation. 12. Define radiation shape factor. 13. Recognize heat exchange between non-black bodies and infinite parallel surfaces. 14. Explain the radiation shields, solar radiation and effect of radiation on temperature measurement

Indicative Contents المحتويات الإرشادية	The main indicative contents are: Method of heat transfer and thermal conductivity (6hr), The plane wall (3hr), Radial systems (3hr), Overall heat transfer coefficient and critical thickness of insulation (3hr), Heat source systems (3hr), Extended surfaces (5hr), Thermal contact resistance (1hr), Lumped heat-capacity system (3hr), Transient heat flow in semi-Infinite solid (3hr), Convection boundary conditions (3hr), Physical mechanism and properties of radiation (3hr), Radiation shape factor (3hr), Heat exchange between non-black bodies and infinite parallel surfaces (3hr), Radiation shields, solar radiation and effect of radiation on temperature measurement (3hr).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in delivering this unit are: 1- Encourage students to participate in the exercises. This is achieved through classes and interactive educational programmers. 2- Improving and expanding critical thinking skills at the same time and by thinking about the type of simple experiments that include some sampling activities of interest to the students. 3-Raise students scientific and knowledge levels by employing the automatic

	technique, conversational approach, and active method.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO # 1, 2, 8,9 and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6, 7 and 13
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 11, 12 and 14
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	**Chapter One: Introduction** • Method of heat transfer
Week 2	**Chapter One: Introduction** • Thermal conductivity
Week 3	**Chapter Two: Steady state conduction** • The Plane wall
Week 4	**Chapter Two: Steady state conduction** • Radial Systems
Week 5	**Chapter Two: Steady state conduction** • Overall heat transfer coefficient • Critical thickness of insulation • Quiz
Week 6	**Chapter Two: Steady state conduction** • Heat source systems
Week 7	**Chapter Two: Steady state conduction** • Extended surfaces
Week 8	**Chapter Two: Steady state conduction** • Extended surfaces • Thermal contact resistance
Week 9	**Chapter Three: Unsteady state conduction** • Introduction • Lumped heat-capacity system
Week 10	**Chapter Three: Unsteady state conduction** • Transient heat flow in semi-Infinite solid • Quiz.
Week 11	**Chapter Three: Unsteady state conduction** • Convection boundary conditions
Week 12	**Chapter Four: Introduction to Radiation** • Physical mechanism • Radiation properties
Week 13	**Chapter Four: Introduction to Radiation** • Radiation shape factor

Week 14	**Chapter Four: Introduction to Radiation** • Heat exchange between non-black bodies • Infinite parallel surfaces
Week 15	**Chapter Four: Introduction to Radiation** • Radiation shields Solar Radiation • Effect of Radiation on Temperature Measurement
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1-Text of lectures 2-Fundamentals of Heat and Mass Transfer, Theodore L.	Yes

	Bergman, Adrienne S. Lavine, Frank P. Incropera, David P. Dewitt, Seventh Edition, 2011.	
Recommended Texts	1.Heat Transfer J. P. Holman, Tenth Edition, 2010. 2.Heat and Mass Transfer Fundamentals & Applications Yunus A. Çengel & Afshin J. Ghajar, fifth Edition, 2015.	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.

Semester five	Theory of Mechanism	ME313

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Theory of Mechanism**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME 313**				
ECTS Credits	**6**				
SWL (hr/sem)	**93**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Jasim Hasan Ilik		**e-mail**	j.h.al-bedhany@uomisan.edu.iq	
Module Leader's Acad. Title	Instructor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ali Husien Hasan		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mechanics - Dynamic	**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	The student will be able to analyze: 1. The linear and angular velocities and accelerations. 2. The CAM and follower movements and design. 3. The gear terminology and stresses due to contact. 4. The role and design of flywheels.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main outcome is graduate a mechanical engineer can introduce analyses of different mechanisms and their velocities and accelerations forces and stresses on them.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Encourage the students to analyze the movements of machine components, the role of them and the types of forces acting on them. The mentioned will be achieved through lectures, tutorials, tests, and project in addition to Laboratories.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	All
	Assignments	1	10% (10)	13	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	9	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	**Chapter One: Introduction to Velocity and Acceleration Diagrams.** • Introduction to movements (linear and angular.
Week 2	**Chapter One: Introduction to Velocity and Acceleration Diagrams.** • Velocity of points on a rolling body.
Week 3	**Chapter Two: Introduction to Velocity and Acceleration Diagrams.** • Introduction to Linear and angular accelerations.
Week 4	**Chapter Two: Introduction to Velocity and Acceleration Diagrams.** • Equivalent linkage and Corioles component. .
Week 5	**Chapter Three: Introduction to Cams and followers.** • Introduction. • Cams and followers types. • Quiz.
Week 6	**Chapter Three: Cams and Followers.** • Displacement diagrams. • Types of Motions. • Construction of Cam Profile.
Week 7	**Chapter Three: Cams and Followers.** • Construction of Cam Profile.
Week 8	**Chapter Four: Introduction to Gears** • Introduction and gear terminology. • Gear requirements and classifications of gears.
Week 9	**Chapter Four: Introduction to Gears** • Terms and definitions and analyses procedure. • Contact Ratio and Number of teeth.
Week 10	**Chapter Four: Introduction to Gears** • Gear Trains.
Week 11	**Chapter Five: Flywheels** • Introduction. • Flywheel mass.
Week 12	**Chapter Five: Flywheels** • Flywheels for Internal Combustion Engines.

	• Quiz.
Week 13	**Chapter Five: Flywheels** • TMD and relevant coefficients.
Week 14	**Reviewing**
Week 15	**Chapter Six: Introduction Design of Machines** • Introduction to Design problems.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Velocity of Crank Slider Mechanism.
Week 2	Lab 2: Velocity of Four and Five Members Mechanisms.
Week 3	Lab 3: Acceleration of Crank Slider Mechanism.
Week 4	Lab 4: Acceleration of Four and Five Members Mechanisms.
Week 5	Lab 5: Cams with Simple Harmonic Motion (SHM).
Week 6	Lab 6: Cams with Uniform acceleration and Retardation (UAR).
Week 7	Lab 7: Cam profiles of SHM and UAR.
Week 8	Lab 8: Cam profiles of UAR.
Week 9	Lab 9: Gears and Pinions
Week 10	Lab 10: Classification of Gears.
Week 11	Lab 11: Gear Trains.
Week 12	Lab 12: Flywheels and Mass Moment of Inertia.

Week 13	Lab 13:Review
Week 14	Lab 14:Examination
Week 15	Lab 15:Final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Theory of Machines by R. S. Khurmi.	Yes
Recommended Texts	1. The theory of Machines by Robert W. Angus First Edition Part I. 2. Theory of Machines and Mechanisms by John J. Dicker, Jordon R. Penock and Joseph E. Shigley	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.

Semester five	Internal Combustion Engines I	ME314

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Internal Combustion Engines I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME314**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Sara Jumah Flayh		**e-mail**	sarajumah@uomisan.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	Assist. Lec.	
Module Tutor	Sara Jumah Flayh		**e-mail**	sarajumah@uomisan.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	02/07/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**ME223**	**Semester**	2

	ME312		1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The module aims are: 1. Teaching of fundamentals of internal combustion engines. 2. Analysis of air standard cycles. 3. Engine operation calculations. 4. Description of different engines systems. 5. Studying The Difference between Wankel Engine and reciprocating engine
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. Gain knowledge about internal combustion engines. 2. Understanding different between internal combustion engines. 3. Using air standard cycle analysis to calculate thermal properties of engines. 4. Calculation engine operation parameters. 5. Study systems that used to sport engine working. 6. Discuss The Difference between Wankel Engine and reciprocating engine. 7. Gain knowledge about Wankel Engine Performance.
Indicative Contents المحتويات الإرشادية	The main indicative contents are: Introduction to reciprocating engine. Familiarization basic engine nomenclature (3hr), Spark ignition engine (6hr), Rotary engines (3hr), Basic power measurements. Indicated Mean effective pressure (3hr), Indicated power, Brake power, and Friction power. (3hr), Mean effective power and Specific fuel consumption (3hr), The Air – Cycle approximation: importance of thermal efficiency. Theoretical cycles. Air – cycle approximations. Air – cycle calculations. Air – cycle efficiency. Effect of

	engine variables (6hr), Use of the fuel – air cycle. Scope of the fuel – air cycle. (3hr), The Actual Engine Cycle (3hr), Definitions. Reasons for supercharging (3hr), Supercharging of S.I. Engine and Supercharging of Diesel Engines. (3hr), Performance computations and Effects of operating variables on supercharged engines. (3hr), Comparison between Wankel Engine and reciprocating engine. Wankel Engine Performance (3hr).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Students learn the fundamentals of internal combustion engines, including the difference between S.I. engines and C.I. engines. The difference between both engines according to the work basics and behavior is also considered. Students learn the main parts of the engines. Air standard cycles are taught to students to know the thermal properties and efficiency of engines. Operation calculations including specifications of piston and cylinder, work, power, mean effective pressure, efficiencies are also given as important analyses for engines. and interactive educational programmers.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2

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

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Chapter One: Basic Engine types and Their Operation** • Introduction to reciprocating engine • Familiarization basic engine nomenclature
Week 2	**Chapter One: Basic Engine types and Their Operation** • Spark ignition engine

Week 3	**Chapter One: Basic Engine types and Their Operation** • Spark ignition engine
Week 4	**Chapter One: Basic Engine types and Their Operation** • Rotary engines
Week 5	**Chapter Two: Engine Power and Performance** • Basic power measurements. • Indicated Mean effective pressure
Week 6	**Chapter Two: Engine Power and Performance** • Indicated power • Brake power • Friction power • quiz
Week 7	**Chapter Two: Engine Power and Performance** • Mean effective power • Specific fuel consumption
Week 8	**Chapter Three: Thermodynamics of I.C. Engine** • The Air – Cycle approximation: importance of thermal efficiency. • Theoretical cycles. Air – cycle approximations.
Week 9	**Chapter Three: Thermodynamics of I.C. Engine** • Air – cycle calculations. • Air – cycle efficiency. • Effect of engine variables
Week 10	**Chapter Three: Thermodynamics of I.C. Engine** • use of the fuel – air cycle. • Scope of the fuel – air cycle
Week 11	**Chapter Three: Thermodynamics of I.C. Engine** • The Actual Engine Cycle
Week 12	**Chapter Four: Supercharged Engines and Their Performance** • Definitions. • Reasons for supercharging
Week 13	**Chapter Four: Supercharged Engines and Their Performance** • Supercharging of S.I. Engine • Supercharging of Diesel Engines • Quiz.
Week 14	**Chapter Four: Supercharged Engines and Their Performance** • Performance computations • Effects of operating variables on supercharged engines
Week 15	**Chapter Five: The Wankel Engine** • Comparison between Wankel Engine and reciprocating engine. • Wankel Engine Performance

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

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1&2	Lab 1: S.I. engines operation.
Week 3&4	Lab 2: C.I. engines operation
Week 5&6	Lab 3: Work
Week 7&8	Lab 4: Power.
Week 9&10	Lab 5: Indicated, brake, friction, parameters.
Week 11&12	Lab 6: Engines exhaust analysis
Week 13	Lab 13:Review
Week 14	Lab 14:Examination
Week 15	Lab 15:Final examination

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1-Text of lectures 2- Engineering Fundamentals of the Internal Combustion Engine. Willard W. Pulkrabek. University of Wisconsin.	Yes

Recommended Texts	1. Internal Combustion Engine Fundamentals. John B. Heywood. McGraw-Hill, Inc., New York.	no
Websites	internal combustion engines videos - Bing video	

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.

Semester five	Gas Dynamics	ME315

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Gas Dynamics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME315**				
ECTS Credits	**3**				
SWL (hr/sem)	**48**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Mohammad Mahdie Saleh Al-Azawii		**e-mail**	Mohammed.alazawii@uomisan.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**ME213**	**Semester**	1 and 2 of level 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	10- Deriving the main and basic equations that govern the compressible flow at different flow speeds and conditions starting from thermodynamic and fluid basics. 11- Differentiating the compressible flow into four different flow conditions according to its speed 12- Applying the compressible flow conditions on variable area ducts using ideal flow conditions (isentropic flow). 13- Taking the effect of normal shock wave on the ideal compressible flow in a variable area duct. 14- Taking the effect of friction on the ideal compressible flow in a constant area duct (Fanno duct). 15- Taking the effect of adding or absorbing heat on the ideal compressible flow in a constant area duct (Rayleigh duct). 16- Analyzing the thrust power and propulsive efficiency of turbojet, turbofan, and turbo prop engines.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing this module, student should be able to: 1. drive the basic equation that govern compressible flow at specific conditions. 2. differentiate between different compressible flow conditions and cases. 3. find the compressible flow characteristics for the case of ideal flow conditions (isentropic flow) in a variable area duct. 4. find the compressible flow characteristics in case of exposing to a normal shock wave in a variable area duct. 5. find the compressible flow characteristics under different flow conditions taking the effect of friction and heat transfer in a constant area duct. 6. find the propulsive efficiency of turbojet.
Indicative Contents	**7. Basics of Compressible Flow:** Course structure, an introduction to the basic equations

المحتويات الإرشادية	and relations of compressible flow is clarified to the student. Some thermodynamic relations are reviewed as these relations are used in compressible flow, Stagnation states, Mach waves and Mach cone. **8. Isentropic Flow:** Isentropic Flow through variable ducts, Nozzle and Diffusers – The convergent and convergent–divergent nozzles and their applications. Use of Gas tables **9. Normal and Oblique Shocks:** Governing equations – Variation of flow parameters across the normal and oblique shocks – Prandtl – Meyer relations – Use of table and charts. **10. Flow Through Ducts:** Flows through constant area ducts with Friction (Fanno flow) and Heat transfer (Rayleigh flow) – Use of tables and charts – Generalized gas dynamics. **11. Jet Propulsion:** Theory of jet propulsion – Thrust equation – Thrust power and propulsive efficiency – Operation principle, cycle analysis and use of stagnation state performance of turbojet, turbofan and turbo prop engines. Rocket engine.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module of Gas Dynamics will adopt an interactive learning approach to actively engage students and enhance their critical thinking skills. The main strategy is to encourage student participation through classes, and interactive tutorials. Students will have the opportunity to actively contribute to

	exercises and discussions, allowing for a deeper understanding of the subject matter. Overall, these learning and teaching strategies are designed to create an engaging learning environment that fosters active participation, critical thinking, and a comprehensive understanding of the concepts covered in the module.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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	20% (20)	3, 6, 9, 12 and 14	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	NA	NA	NA	All
	Report	1	10% (10)	15	All
Summative	**Midterm Exam**	2 hr	10% (10)	7	All

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Chapter One: Basics of Compressible Flow** • An introduction to the basic equations and relations of compressible flow. Review of some thermodynamic relations which are used in compressible flow
Week 2	**Chapter One: Basics of Compressible Flow** • Stagnation states, Mach waves and Mach cone
Week 3	**Chapter Two: Isentropic Flow** • Isentropic Flow through variable ducts • Quiz
Week 4	**Chapter Two: Isentropic Flow** • Nozzle and Diffusers -The convergent and convergent–divergent nozzles and their applications. Use of Gas tables
Week 5	**Chapter Two: Isentropic Flow** • Nozzle and Diffusers -The convergent and convergent–divergent nozzles and their applications. Use of Gas tables
Week 6	**Chapter Two: Isentropic Flow** • Nozzle and Diffusers -The convergent and convergent–divergent nozzles and their applications. Use of Gas tables • Quiz
Week 7	**Chapter Three: Normal and Oblique Shocks** • Governing equations – Variation of flow parameters across the normal shocks
Week 8	**Chapter Three: Normal and Oblique Shocks** • Governing equations – Variation of flow parameters across the oblique shocks
Week 9	**Chapter Three: Normal and Oblique Shocks** • Prandtl – Meyer relations – Use of table and charts. • Quiz

Week 10	**Chapter Four: Flow Through Ducts** • Flows through constant area ducts with Friction (Fanno flow) - Use of tables and charts – Generalized gas dynamics
Week 11	**Chapter Four: Flow Through Ducts** • Flows through constant area ducts with Heat transfer (Rayleigh flow) - Use of tables and charts – Generalized gas dynamics
Week 12	**Chapter Four: Flow Through Ducts** • Flows through constant area ducts with Friction (Fanno flow) and Heat transfer (Rayleigh flow) – Use of tables and charts – Generalized gas dynamics. • Quiz
Week 13	**Chapter Five: Jet Propulsion** • Theory of jet propulsion – Thrust equation – Thrust power and propulsive efficiency – Operation principle, cycle analysis and use of stagnation state performance of turbojet, turbofan and turbo prop engines
Week 14	**Chapter Five: Jet Propulsion** • Theory of jet propulsion – Thrust equation – Thrust power and propulsive efficiency – Operation principle, cycle analysis and use of stagnation state performance of turbojet, turbofan and turbo prop engines. • Quiz
Week 15	**Chapter Five: Jet Propulsion** • Rocket engine
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week	NA

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the**

		Library?
Required Texts	1- Michel A. Saad, “Compressible Fluid Flow, Second Edition”. 2- Genick Bar Meir, 2013, “Fundamental of Compressible Fluid Mechanics 3- Asher H. Shapiro, 1953, “The Dynamic and Thermodynamic of compressible Fluid Flow”, Volume I.	Yes
Recommended Texts	1- Michel A. Saad, “Compressible Fluid Flow, Second Edition”.	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.

Semester five	Manufacturing Process	ME316

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Manufacturing Processes**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME317**				
ECTS Credits	**7**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Sameer F. Hamad		**e-mail**	Sfhamad4@uomisan.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	23/06/2023		**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. The course aims to introduce students to various advanced manufacturing and production processes. 2. Students acquire the skills required to work on production machines, metal welding and various plumbing operations. 3. Introducing students to different traditional machines and comparing them with programmed ones and how to prepare different operating programs. 4. Ability to communicate with scientific and engineering developments. 5. Knowing an idea about the mechanism of orthogonal cutting and how they can withstand it. 6. Understanding the powder metallurgy, knowing its types, manufacturing methods, limitations and advantages.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will be able to: 1. Provide a good understanding of the manufacturing processes for different materials. 2. Teach the theory of yield criteria 3. Calculate yield stress and force in bulk deformation processes types. 4. Learn basics of computer numerical controlled machining and part programming. 5. Learn Fundamentals includes Casting and form casting processes, mold castings, powder metallurgy.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1. Mechanical Properties of Materials, tensile test, Stress-Strain Curves, Ductility, True Stress and True Strain Curves, Instability in Tension, Types of Stress-Strain Curves, Temperature Effects, Triaxial Stresses, Yield Criteria, and Work of Deformation. 2. Bulk Deformation Types: Forging, Open Die Forging, Forging of a Rectangular Workpiece in Plane Strain, Forging of a Solid Cylindrical Workpiece, Types of Forging, Various Forging Operations, Forging Equipment, Rolling Processes, Hot Rolling, Mechanics of Flat Rolling,, Various Roll Operations, Extrusion, Extrusion Types, Mechanics of Extrusion, Effect of Strain Rate, Extrusion Types, Die Design and Materials, Drawing, Mechanics of Rod and Wire Drawing, Derive Pressure Equation of Wire or Rod Drawing, Drawing of Tubes,Maximum Reduction per Pass, Swaging. 3. Expendable Mold, Permanent Pattern Casting - Sand Casting – Shell Molding - Investment Casting (lost wax casting) - permanent mold casting processes - die casting - centrifugal casting - semi-centrifugal casting – Single-Crystal Blades – Casting Defects - Shrinkage – Test for Fluidity. 4. Yield Point Elongation – Sheet metal Forming Processes Types – shearing Process – Punch Force – bending Process – Minimum Bend Radius – Springback – Bending Forces – Tube Bending – Beading –Stretch Forming – Hydroforming – Spinning – Tube Spinning – HERF - Explosive Forming – Electrohydraulic Forming Magnetic – Pulse Forming - Deep Drawing – Ironing – Defects in Deep Drawing 5. Powder Production – Atomization – Reduction – Electrolytic Deposition–Carbonyls

	Comminution – Mechanical Alloying – Blending Metal Powders – Compaction of Metal Powders – Density Distribution Pressure Distribution in Powder Compaction – Isostatic Pressing – Miscellaneous Compacting and Shaping Processes – Sintering – Sintering Mechanisms – Finishing Operations – Limitation of Powder Metallurgy – Applications of Powder Metallurgy. 6. Material Removal Processes Types – Mechanics of Chip Formation –Cutting Ratio – Velocities in the Cutting Zone - Types of Chips Produced in Metal Cutting – Mechanics of Oblique Cutting – Force in Orthogonal Cutting – Thrust Force and Its Direction – Shear and Normal Stresses in the Cutting Zone – Shear Angle Relationships – Specific Energy – Temperatures in Cutting – Variable Affecting Temperature – Techniques for Measuring Temperature. 7. Tool Wear and Failure – Flank Wear – Tool Life Curve – Crater Wear –Nose Wear – Chipping – Surface Finish of Machined Part – Inserts –Coated Tools – Turning Processes Types – Non-Traditional Machining. 8. Joining Processes Types – Oxyfuel Gas Welding – Arc Welding Processes – Plasma Arc Welding – High Energy Beam Welding – Solid State Welding Processes (USW, FRW, RW) – Adhesive Bonding –Mechanical Fastening – Hole Preparation - Threaded Fasteners – Rivets – Various Methods of Fastening.

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. Each student must present seminar about one of the subjects of manufacturing processes.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (25)	2-11	All
	Assignments	2	10% (10)	2-12	All
	Projects/lab.	5	10% (10)	4-13	All
	Report	1	10% (10)	12	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Iron and steel making: Iron ores Pig iron making, Blast furnace.

	Steel making: Process of steel making.
Week 2	Casting fundamentals: Casting processes characteristics, Casting techniques. Sand casting: Molding sand, Sand testing, Patterns, Molding machines, foundry furnaces, Cleaning and inspection of casting. Die casting methods: Pressure die casting methods.
Week 3	Other casting methods: Centrifugal casting , Lost-wax casting, Shell molding process, Continuous casting.
Week 4	Metal forming: Hot working of metal, Cold working of metal.
Week 5	Hammering /Forging: Types of forging processes, Hand forging tools, Automatic hammer forging, Die forging machines.
Week 6	Rolling: Types of Rolling machines, Calculation the angle of contact, Hot and cold Rolling processes.
Week 7	Extrusion: Methods of Extrusion, Tube Extrusion, Impact Extrusion.
Week 8	Drawing: Wire drawing machines, Tube drawing machines, Metal preparation for drawing.
Week 9	Sheet metal work: Processes of sheet metal forming, Joining of sheet metal, Soldering.
Week 10	Metal cutting: Chiseling steel metal, Filing steel metal, Sawing steel metal.
Week 11	Turning operations: Types of turning machines, Parts of turning machines, The lath as a general purpose machine. Shaping operations: Classification of shapers.
Week 12	Milling operations: Types of milling machines. Drilling operations: Drills, Reamers, Drilling machines, Boring machines. Grinding operations: Types of grinding machines, Grinding tools.
Week 13	Welding: Electric Arc Welding, Metal Arc Welding, Tungsten and Metal Inert gas welding, Plasma welding. Fusion welding: Oxy acetylene welding, Thermit welding, Electron beam welding, Laser welding, Ultrasonic welding, Diffusion welding, Projection welding, Flash welding.
Week 14	Soldering and Brazing: Brazing and Soldering metals and alloys, The factors that the process depends on.

	Solid-state welding and other types of welding: Electric resistance welding, Friction ,welding, Explosion welding.
Week 15	-CNC machines: NC definition and comparison, Traditional tool machines and CNC machines comparison, Financial advantages and disadvantages of CNC, DNC- Direct numerical control CAD/CAM-Hierarchical NC. -Non Traditional machining: Ultrasonic machining, Chemical machining, Electro chemical machining, Electro spark machining, Electron beam machining, Laser machining, Electron grinding machining
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Manufacturing processes, second edition; H.N. Gupta, R.C. Gupta, Arun Mittal; Published by New Age International (P) Ltd., Publishers. 2. Fundamentals of Modern Manufacturing, Materials, Processes, and Systems, Fourth edition; Mikell P. Groover; JOHN WILEY & SONS, INC. 3. Principles of metal manufacturing processes (1999); J. Beddoes, M. Bibby. 4. Manufacturing Engineering and Technology, Sixth edition; Serope Kalpakjian, Steven R. Schmid.	No
Recommended Texts		
Websites		

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**

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

Semester six

Semester six	Numerical Analysis	E321

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Numerical Analysis**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E321**				
ECTS Credits	**5**				
SWL (hr/sem)	**78**				
Module Level		3	**Semester of Delivery**		2
Administering Department		Mech. Department	**College**	Engineering College	
Module Leader	Mohammad Mahdie Saleh Al-Azawii		**e-mail**	Mohammed.alazawii@uomisan.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		10/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	**E111, E121, E211, and E221**	**Semester**	1 and 2 of level 1 and 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- To study numerical analysis methods and their applications in mechanical engineering. 2- To solve mechanical engineering problems with numerical analysis techniques. 3- To learn the basics of programming language and to write simple codes using MATLAB language.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing this module, student should be able to: 17- Apply numerical methods to solve linear algebraic equations and linear simultaneous equations. 18- Understand the basics of finite difference methods and interpolation. 19- Understand numerical differentiation and integration. 20- Apply curve fitting methods to represent experimental data. 21- Understand the numerical solution of ordinary differential equations. 22- Understand the numerical solution of partial differential equations. 23- Understand the basics concepts of finite elements method. 24- Solve mechanical engineering problems numerically using programming language (MATLAB language).
Indicative Contents المحتويات الإرشادية	**12.Solution of Linear Algebraic Equations:** Fixed-point method, and Newton-Raphson method **13.Solution of Linear Simultaneous Equations:** Gauss-Seidel Method, Gauss Elimination method, and

	Gauss-Jordan method **14.Finite Differences and Interpolation:** Forward differences, Backward differences, Center differences, Newton Interpolation method, and Lagrange Interpolation **15.Numerical Differentiation and Integration:** Numerical Differentiation, Trapezoidal method, Simpson method, and Gauss Quadrature method **16.Curve Fitting:** Linear and Polynomial Fitting, Exponential Fitting, Power Function Fitting **17.Numerical Solution of Ordinary Differential Equations:** Euler First Order method, Modified Euler method, Runge-Kutta First Order method, Euler Second Order method, and Runge-Kutta Second Order method **18.Numerical Solution of Partial Equations:** Solution of Laplace Equation in two-dimension, Solution of Wave equation, and Solution of Heat equation **19.Introduction to Finite Elements Method** Weighted Residual, Galerkin Method, Shape Functions, Variational Approach, Steps of Finite Elements Method, Solution of 1-dim Stress Analysis Problems, and Solution of Heat Conduction Problems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module of Numerical Analysis will adopt an interactive learning approach to actively engage students and enhance their critical thinking skills. The main strategy is to encourage student participation through classes, programming laboratory,

	and interactive tutorials. Students will have the opportunity to actively contribute to exercises and discussions, allowing for a deeper understanding of the subject matter. Overall, these learning and teaching strategies are designed to create an engaging learning environment that fosters active participation, critical thinking, and a comprehensive understanding of the concepts covered in the module.

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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	10% (10)	3, 5, 7, 9 and 11	All
	Assignments	2	10% (10)	6, 10	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	15	All

Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Chapter One: Solution of Linear Algebraic Equations** • Fixed-point iteration method, and Newton-Raphson method
Week 2	**Chapter Two: Solution of Linear Simultaneous Equations** • Gauss-Seidel Method and Gauss Elimination method
Week 3	**Chapter Two: Solution of Linear Simultaneous Equations** • Gauss Elimination method (cont.) • Gauss-Jordan method • Quiz
Week 4	**Chapter Three: Finite Differences and Interpolation** • Forward differences, Backward differences, and Center differences
Week 5	**Chapter Three: Finite Differences and Interpolation** • Newton Interpolation method, and Lagrange Interpolation • Quiz
Week 6	**Chapter Four: Numerical Differentiation and Integration** • Numerical Differentiation, Trapezoidal method, Simpson method, and Gauss Quadrature method
Week 7	**Chapter Five: Curve Fitting:** • Linear and Polynomial Fitting • Quiz
Week 8	**Chapter Five: Curve Fitting:** • Exponential Fitting and Power Function Fitting
Week 9	**Chapter Six: Numerical Solution of Ordinary Differential Equations** • Euler First Order method and Modified Euler method • Quiz

Week 10	**Chapter Six: Numerical Solution of Ordinary Differential Equations** • Runge-Kutta First Order method, Euler Second Order method, and Runge-Kutta Second Order method
Week 11	**Chapter Seven: Numerical Solution of Partial Equations** • Solution of Laplace Equation in two-dimensions • Quiz.
Week 12	**Chapter Seven: Numerical Solution of Partial Equations** • Solution of Wave equation
Week 13	**Chapter Seven: Numerical Solution of Partial Equations** • Solution of Heat equation
Week 14	**Chapter Eight: Introduction to Finite Elements Method** • Weighted Residual, Galerkin Method, Shape Functions, Variational Approach, and Steps of Finite Elements Method
Week 15	**Chapter Eight: Introduction to Finite Elements Method** • Solution of 1-dim Stress Analysis Problems, and Solution of Heat Conduction Problems
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2	Programming language Code to find the Roots of non-linear equation.
Week 3-4	Programming language Code for matrices result from System of Linear algebraic Equations.
Week 5	Programming language Code for Interpolation.
Week 6-7	Programming language Code for numerical integration.
Week 8-9	Programming language Code for curve fitting.
Week 10-12	Programming language Code for Numerical solution of ordinary differential equations.
Week 13-15	Programming language Code for Numerical solution of partial differential equations by

	finite difference.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	2. 1. "Numerical Methods for Engineers and Scientists", An Introduction with Applications Using MATLAB. by Amos Gilat and Vish, Wiley 3rd edition, 2014	Yes
Recommended Texts	1. Methods for Engineers and Scientists", Joe Hoffman, McGraw-Hill Book Company,1993. 2. "Applied Numerical Methods with MATLAB for Engineers and Scientists", 2nd Edition, by S. Chapra. 3. "Applied Numerical Analysis", Gerald,C.F. and Wheatley, P.O., 6th Edition, Pearson Education, 2006. 4. "Numerical Methods in Science And Engineering", P. Dechaumpwwhai, N. Wansophark, Oxford OX4 2JZ, U.K., 2020. 5. "Numerical Methods for Engineer", 3rd Edition by SANTOSH K GUPTA 6. "Numerical Methods for Engineers",Steven C. Chapra, Raymond P. Canale, McGraw Hill, 6th edition, 2010.	Yes
Websites		

Grading Scheme

مخطط الدرجات

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

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

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

Semester six	Heat Transfer II	ME322

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Heat Transfer II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME322**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Ahmed Kadhim Alshara		**e-mail**	dr.ahmed_alshara@uomisan.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Murtadha Saeed Mohammed		**e-mail**	murtadha.saeed@uomisan.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Heat Transfer I	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The module aims are: 1. Be educated on heat transfer methods. 2. Know the laws of heat transfer and their calculations. 3. Develop your understanding of heat transfer system thermal load calculations. 4. Identify the relationships that were examined. 5. Studying the applications of heat transfer 6. Identify the most important design parameters for heat transfer applications and systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. Define the thermal and hydrodynamics boundary layers. 2. Identify the relations of boundary layers and range of Reynolds number. 3. Recognize the external forced convection. 4. Summarize the main relations of external flow and its ranges. 5. Define the mean temperature in the internal forced convection. 6. Discuss the developed and fully developed flow in the internal forced convection. 7. Describe the internal forced convection at constant heat flux and constant temperature. 8. Define the Rayleigh number in the natural convection. 9. Discus the boundary layer in the natural convection. 10. Explain the arrangements of natural convection. 11. Identify the type of heat exchangers. 12. Define the log mean temperature difference 13. Recognize the effectiveness-NTU method.
Indicative Contents	The main indicative contents are:

المحتويات الإرشادية	Velocity boundary layer and thermal boundary layer (6hr), Non-dimensional groups numbers analysis (3hr), Steady state forced convection and friction factors (3hr), Empirical relation of external flow (3hr), Flow across cylinder and sphere and flow across banks of tubes (3hr), Average temperature and laminar and turbulent flow in tubes (3hr), Hydrodynamics and thermal entrance region (3hr), Empirical relation for pipe and tube flow (3hr), Free convection from vertical plate and Free convection from inclined plate (3hr), Free convection from horizontal plate (3hr), Free convection from horizontal cylinder and sphere (3hr), Types of heat exchangers and fouling factor (3hr), Analysis of heat exchangers and counter heat exchanger (3hr), The log mean temperature difference and the effectiveness-NTU method (3hr).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in delivering this unit are: 1- Encourage students to participate in the exercises. This is achieved through classes and interactive educational programmers. 2- Improving and expanding critical thinking skills at the same time and by thinking about the type of simple experiments that include some sampling activities of interest to the students. 3-Raise students scientific and knowledge levels by employing the automatic technique, conversational approach, and active method.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO # 1, 2, 8,9 and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6, 7 and 13
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 11 and 12
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	**Chapter One: Introduction to Convection** • Velocity boundary layer
Week 2	**Chapter One: Introduction to Convection** • Thermal boundary layer
Week 3	**Chapter One: Introduction to Convection** • Non-dimensional groups numbers analysis
Week 4	**Chapter Two: Introduction to External Flow** • Steady state forced convection • Friction factors
Week 5	**Chapter Two: Introduction to External Flow** • Empirical relation of external flow • quiz
Week 6	**Chapter Two: Introduction to External Flow** • Flow across cylinder and sphere • Flow across banks of tubes
Week 7	**Chapter Three: Introduction to Internal Flow** • Average temperature • Laminar and turbulent flow in tubes
Week 8	**Chapter Three: Introduction to Internal Flow** • Hydrodynamics and thermal entrance region
Week 9	**Chapter Three: Introduction to Internal Flow** • Empirical relation for pipe and tube flow
Week 10	**Chapter Four: Introduction to Natural Convection** • Free convection from vertical plate • Free convection from inclined plate. • Quiz.
Week 11	**Chapter Four: Introduction to Natural Convection** • Free convection from horizontal plate
Week 12	**Chapter Four: Introduction to Natural Convection** • Free convection from horizontal cylinder and sphere
Week 13	**Chapter Five: Introduction to Heat Exchangers** • Types of heat exchangers • Fouling factor. • Report Due.
Week 14	**Chapter Five: Introduction to Heat Exchangers** • Analysis of heat exchangers • Counter heat exchanger

Week 15	**Chapter Five: Introduction to Heat Exchangers** • The log mean temperature difference • The effectiveness-NTU method
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Radial and linear heat transfer by conduction in solid
Week 2	Lab 2: Radial and linear heat transfer by conduction in solid
Week 3	Lab 3: Effectiveness of Extended Surface (Pin Fin)
Week 4	Lab 4: Effectiveness of Extended Surface (Pin Fin)
Week 5	Lab 5: Radiation Heat Transfer Experiment
Week 6	Lab 6: Radiation Heat Transfer Experiment
Week 7	Lab 7: Natural and Forced Convection Heat Transfer
Week 8	Lab 8: Natural and Forced Convection Heat Transfer
Week 9	Lab 9: Performance of shell and tube heat exchanger
Week 10	Lab 10: Performance of shell and tube heat exchanger
Week 11	Lab 11: Cross Flow Heat Exchanger
Week 12	Lab 12: Cross Flow Heat Exchanger
Week 13	Lab 13:Review
Week 14	Lab 14:Examination
Week 15	Lab 15:Final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1-Text of lectures 2-Fundamentals of Heat and Mass Transfer, Theodore L. Bergman, Adrienne S. Lavine, Frank P. Incropera, David P. Dewitt, Seventh Edition, 2011.	Yes
Recommended Texts	1.Heat Transfer J. p . Holman, Tenth Edition, 2010. 2.Heat and Mass Transfer Fundamentals & Applications Yunus A. Çengel & Afshin J. Ghajar, fifth Edition, 2015.	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.

Semester six	Theory of Machines	ME323

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Theory of Mechanism**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME 313**				
ECTS Credits	**6**				
SWL (hr/sem)	**93**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Jasim Hasan Ilik		**e-mail**	j.h.al-bedhany@uomisan.edu.iq	
Module Leader's Acad. Title	Instructor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ali Husien Hasan		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Engineering Mechanics - Dynamic	**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	The student will be able to analyze: 1. The linear and angular velocities and accelerations. 2. The CAM and follower movements and design. 3. The gear terminology and stresses due to contact. 4. The role and design of flywheels.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main outcome is graduate a mechanical engineer can introduce analyses of different mechanisms and their velocities and accelerations forces and stresses on them.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Encourage the students to analyze the movements of machine components, the role of them and the types of forces acting on them. The mentioned will be achieved through lectures, tutorials, tests and project in addition to Laboratories.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	All
	Assignments	1	10% (10)	13	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	9	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	**Chapter One: Introduction to Velocity and Acceleration Diagrams.** • Introduction to movements (linear and angular.
Week 2	**Chapter One: Introduction to Velocity and Acceleration Diagrams.** • Velocity of points on a rolling body.
Week 3	**Chapter Two: Introduction to Velocity and Acceleration Diagrams.** • Introduction to Linear and angular accelerations.
Week 4	**Chapter Two: Introduction to Velocity and Acceleration Diagrams.** • Equivalent linkage and Corioles component. .
Week 5	**Chapter Three: Introduction to Cams and followers.** • Introduction. • Cams and followers types. • Quiz.
Week 6	**Chapter Three: Cams and Followers.** • Displacement diagrams. • Types of Motions. • Construction of Cam Profile.
Week 7	**Chapter Three: Cams and Followers.** • Construction of Cam Profile.
Week 8	**Chapter Four: Introduction to Gears** • Introduction and gear terminology. • Gear requirements and classifications of gears.
Week 9	**Chapter Four: Introduction to Gears** • Terms and definitions and analyses procedure. • Contact Ratio and Number of teeth.
Week 10	**Chapter Four: Introduction to Gears** • Gear Trains.
Week 11	**Chapter Five: Flywheels** • Introduction. • Flywheel mass.
Week 12	**Chapter Five: Flywheels** • Flywheels for Internal Combustion Engines.

	• Quiz.
Week 13	**Chapter Five: Flywheels** • TMD and relevant coefficients.
Week 14	**Reviewing**
Week 15	**Chapter Six: Introduction Design of Machines** • Introduction to Design problems.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Velocity of Crank Slider Mechanism.
Week 2	Lab 2: Velocity of Four and Five Members Mechanisms.
Week 3	Lab 3: Acceleration of Crank Slider Mechanism.
Week 4	Lab 4: Acceleration of Four and Five Members Mechanisms.
Week 5	Lab 5: Cams with Simple Harmonic Motion (SHM).
Week 6	Lab 6: Cams with Uniform acceleration and Retardation (UAR).
Week 7	Lab 7: Cam profiles of SHM and UAR.
Week 8	Lab 8: Cam profiles of UAR.
Week 9	Lab 9: Gears and Pinions
Week 10	Lab 10: Classification of Gears.
Week 11	Lab 11: Gear Trains.
Week 12	Lab 12: Flywheels and Mass Moment of Inertia.

Week 13	Lab 13:Review
Week 14	Lab 14:Examination
Week 15	Lab 15:Final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Theory of Machines by R. S. Khurmi.	Yes
Recommended Texts	3. The theory of Machines by Robert W. Angus First Edition Part I. 4. Theory of Machines and Mechanisms by John J. Dicker, Jordon R. Penock and Joseph E. Shigley	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.

Semester six	Internal Combustion Engines II	ME324

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Internal Combustion Engines II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME324**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	3		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Sara Jumah Flayh		**e-mail**	sarajumah@uomisan.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	Assist. Lec.	
Module Tutor	Sara Jumah Flayh		**e-mail**	sarajumah@uomisan.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	02/07/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**ME314**	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The module aims are: 1. Teaching of engines fuels. 2. Teaching of combustion chamber phenomena (knocking, combustion, flame propagation, different flow motions). 3. Develop your understanding of Carbureting proses and Ignition system. 4. Identify the important of General combustion theory. 5. Description of different engines systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. Understanding difference among engines fuels. 2. Knowing the engines undesired phenomena such as knocking and how can avoid them. 3. Study combustion phenomenon and flame propagation. 4. Study fluids motions inside engines. 5. Gain knowledge about Engine Design.
Indicative Contents المحتويات الإرشادية	The main indicative contents are: Heating value of fuels, Ratings of SI Engine Fuels (3hr), Important Qualities of SI Engine Fuels. (3hr), Qualities and Ratings CI Engine fuels, Combustion Calculations (3hr), Main metering system, The simple carburetor (3hr), Mixture control, carburetor types. The injection carburetor. (3hr), Ignition system (3hr), General combustion theory. Normal combustion and flame front propagation (3hr), Abnormal combustion. Engine operation variables affecting detonation. Combustion chamber design. (3hr),

	General information pertaining to the C.I. Engine characteristics of the CI Engine. (3hr), Fuel supply and injection systems (3hr), Combustion in the CI Engine. Ignition delay. (3hr), General functions and characteristics of the combustion chamber. Comparison of some basic design of CI Engine combustion chamber. (3hr), cooling systems (3hr). Mechanism of lubrication. Types of bearings used in IC Engines (3hr). Engine Design (3hr).

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Students know complete description about different systems that are associated with engines such as intake system, exhaust system, engine cooling system, and lubrication system. Students learn general aspects of engines fuels including comparison among them. Phenomena that take place within engines (knocking, combustion, flame propagation, different fluids motions) are taught to students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	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**	2	15% (10)	6, 13	LO #1, 2, 3 and 4, 5
	Assignments	2	15% (10)	7, 14	LO #1, 2, 3 and 4, 5
	Projects / Lab.	…..	…….		
	Report	1	10% (10)	13	
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	**Chapter One: Fuels of I.C. engines and Combustion Calculations** • Heating value of fuels. • Ratings of SI Engine Fuels
Week 2	**Chapter One: Fuels of I.C. engines and Combustion Calculations** • Important Qualities of SI Engine Fuels.
Week 3	**Chapter One: Fuels of I.C. engines and Combustion Calculations** • Qualities and Ratings CI Engine fuels. • Combustion Calculations.
Week 4	**Chapter Two: Carbureting and Carburetors** • Main metering system. • The simple carburetor. • Variables metering carburetor performance.

Week 5	**Chapter Two: Carbureting and Carburetors** • Mixture control, carburetor types. • The injection carburetor.
Week 6	**Chapter Three: Spark Ignition** • Ignition system requirements. • Battery ignition system. • Magneto ignition system. • Spark plugs. • Ignition timing. • quiz
Week 7	**Chapter Four: Combustion in S.I. Engines** • General combustion theory. • Normal combustion and flame front propagation.
Week 8	**Chapter Four: Combustion in S.I. Engines** • Factors affecting flame speed. • Rate of pressure rise. • Abnormal combustion. • Engine operation variables affecting detonation. • Combustion chamber design.
Week 9	**Chapter Five: The Compression Ignition Engine and Fuel Injection** • General information pertaining to the C.I. Engine characteristics of the CI Engine.
Week 10	**Chapter Five: The Compression Ignition Engine and Fuel Injection** • Types of CI Engines. • Fuel supply and injection systems. • Typical solid injection systems. • The injector nozzle.
Week 11	**Chapter Six: Combustion in the CI Engine** • Combustion in the CI Engine. • Ignition delay.
Week 12	**Chapter Six: Combustion in the CI Engine** • Combustion knock in the CI Engine. • Variables affecting ignition delay. • General functions and characteristics of the combustion chamber. • Comparison of some basic design of CI Engine combustion chamber.
Week 13	**Chapter Seven: Cooling of IC Engine** • Liquid cooling systems. • Air cooling system. • Engine cooling problems. • Quiz.
Week 14	**Chapter Eight: Lubrication of IC Engines** • Mechanism of lubrication. • Types of bearings used in IC Engines. • Properties of lubricating oils.

	• Additives. • Lubricating systems.
Week 15	**Chapter Nine: Engine Design** • Preliminary Analysis, cylinder number, size and arrangement. • Detailed design procedure.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1-Text of lectures 2- Engineering Fundamentals of the Internal Combustion Engine. Willard W. Pulkrabek. University of Wisconsin.	Yes
Recommended Texts	1. Internal Combustion Engine Fundamentals. John B. Heywood. McGraw-Hill, Inc., New York.	no
Websites	internal combustion engines videos - Bing video	

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.

Semester six	Turbo Machinery	ME325

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Turbo Machinery**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME325**				
ECTS Credits	**6**				
SWL (hr/sem)	**93**				
Module Level	3		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Mohammad Mahdie Saleh Al-Azawii		**e-mail**	Mohammed.alazawii@uomisan.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**ME222**	**Semester**	2 of level 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	7. Discriminating turbomachines according to different criteria; work done on or by and the direction of flow. 8. Deriving the main equations govern turbomachines form its first principles. 9. Deriving different types of efficiencies and power for different types of turbomachines. 10. Using similarity and similitude methods to design any prototype turbomachine using the basic information from any module turbomachine under similar design conditions. 11. Analyzing flow over surfaces of blade of any turbomachine. 12. Using the data extracted from the above point to calculate the performance characteristics of any turbomachines.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing this module, student should be able to: 1- draw and analyze the velocity diagrams for any turbomachines, such as pumps, turbines and compressors. 2- determine the power and efficiency of any turbomachines. 3- choose/recommend the needed turbomachines device using charts. 4- differentiate between different types of turbomachines based on the inlet flow, such as axial flow, radial flow and mixed flow devices. 5- find the different types of losses that impact the performance of any turbomachines during the operation.
Indicative Contents المحتويات الإرشادية	**20. Introduction to Turbomachinery:** Application of 1st and 2nd laws of thermodynamics to turbo machines. **21. Pumps and Fans:** Classification of rotodynamic pumps, components of centrifugal pump, types of heads, velocity triangles and

	their analysis, effect of outlet blade angle, cavitation, NPSH, specific speed, performance characteristics of centrifugal pump, series and parallel operation of pumps, system resistance curve, selection of pumps **22. Water Turbines:** Impulse turbine- Pelton Type, Reaction turbine- Francis and Kaplan, Similarity law of water turbines, unit and specific quantities. . **23. Compressor:** Axial and Centrifugal compressors, construction, stage velocity triangles and its analysis, flow through the blade rows, performance characteristics. **24. Gas Turbine:** Classifications (Axial and Radial), construction details, velocity diagrams and analysis of (single & multistage) turbines, governing, performance characteristics.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module of Turbo Machinery will adopt an interactive learning approach to actively engage students and enhance their critical thinking skills. The main strategy is to encourage student participation through classes, and interactive tutorials. Students will have the opportunity to actively contribute to exercises and discussions, allowing for a deeper understanding of the subject matter. Overall, these learning and teaching strategies are designed to create an engaging learning

	environment that fosters active participation, critical thinking, and a comprehensive understanding of the concepts covered in the module.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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	10% (10)	3, 6, 9, 12 and 14	All
	Assignments	2	10% (10)	5, 10	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	15	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Chapter One: Introduction to Turbomachinery** • Application of 1st and 2nd laws of thermodynamics to turbo machines.
Week 2	**Chapter Two: Pumps and Fans** • Classification of rotodynamic pumps, components of centrifugal pump, types of heads, velocity triangles and their analysis, effect of outlet blade angle
Week 3	**Chapter Two: Pumps and Fans** • Classification of rotodynamic pumps, components of centrifugal pump, types of heads, velocity triangles and their analysis, effect of outlet blade angle
Week 4	**Chapter Two: Pumps and Fans** • Cavitation, NPSH, specific speed
Week 5	**Chapter Two: Pumps and Fans** • Cavitation, NPSH, specific speed • Quiz
Week 6	**Chapter Two: Pumps and Fans** • Performance characteristics of centrifugal pump, series and parallel operation of pumps, system resistance curve, selection of pumps
Week 7	**Chapter Three: Water Turbines** • Impulse turbine- Pelton Type
Week 8	**Chapter Three: Water Turbines** • Impulse turbine- Pelton Type • Quiz
Week 9	**Chapter Three: Water Turbines** • Reaction turbine- Francis and Kaplan
Week 10	**Chapter Three: Water Turbines** • Reaction turbine- Francis and Kaplan
Week 11	**Chapter Three: Water Turbines** • Similarity law of water turbines, unit and specific quantities. • Quiz

Week 12	**Chapter Four: Compressor** • Axial and Centrifugal compressors, construction, stage velocity triangles and its analysis, flow through the blade rows, performance characteristics.
Week 13	**Chapter Four: Compressor** • Axial and Centrifugal compressors, construction, stage velocity triangles and its analysis, flow through the blade rows, performance characteristics. • Quiz
Week 14	**Chapter Five: Gas Turbine** • Classifications (Axial and Radial), construction details, velocity diagrams and analysis of (single & multistage) turbines, governing, performance characteristics
Week 15	**Chapter Five: Gas Turbine** • Classifications (Axial and Radial), construction details, velocity diagrams and analysis of (single & multistage) turbines, governing, performance characteristics. • Quiz
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1-2	Properties of Centrifugal Impellers
Week 3-5	Parallel of Centrifugal Pumps
Week 6-8	Series of Centrifugal Pumps
Week 9-11	Pelton Turbine
Week 12-14	Francis Turbine

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the**

		Library?
Required Texts	4- Turbomachinery Design and Theory, (2003), Rama S. R. Gorla, and Aijaz A. Khan. 5- Principles of Turbomachinery, (1995), R.K. Turton, Second Edition. 6- Fluid Mechanics, Thermodynamics of Turbomachinery, (1998) S.L Dixon, B. Eng., PH.D. Fourth Edition.	Yes
Recommended Texts	1- Turbomachinery Design and Theory, (2003), Rama S. R. Gorla, and Aijaz A. Khan	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.

Semester six	Electrical Machines	ME326

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Machines**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME326**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	3		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Rabee hadi hassan		**e-mail**	rabia.h.h@misan.edu.iq	
Module Leader's Acad. Title	Ass. Lecture		**Module Leader's Qualification**	M.Sc	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electrical Machines	**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. Identifying the machine's (continuous and alternating) installation and derivation of the E.M.F equation and the equivalent circuit of the motors 2. Identify the types of generators and their features. 3. Identify the types of motors and their features. 4. Learn about the applications of generators and motors. 5. Identify electrical transformers and derive the E.M.F equation. and its equivalent circuit. 6. Learn how synchronous machines work and features 7. Learn how semiconductors work 8. Learn how to measure electrical and non-electrical quantities.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learn how DC and AC generators work and their features. 2. Learn how DC and AC motors work and the features 3. Explain the basic principles of the work of generators and synchronous motors and link them to practical applications. 4. Explain the basic principles of semiconductor work 5. Explanation of the basic principles of the work of relays and circuit breakers 6. Explanation of the basic principles of the mechanism of measuring electrical and non-electrical quantities 7. Allocating lectures to solve theoretical issues and discuss basic concepts. 8. Directing students to each other to benefit from systematic training for the third stage.
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	Part A – D.C.machine theory and induction motor DC machine construction– E.M.F. Equation and output equation and commutation, Types of dc generators DC Motor types Dc generators characteristics, Starting of dc motors Speed control, Principle of action E.M.F. equation, leakage reactions [15 hrs] equivalent circuit, voltage regulation and efficiency, open circuit ,and short circuit tests. Production of rotating magnetic field –[15 hrs] induction motor - Production of rotating magnetic field,synchronous speed and slip, equivalent circuit – torque / speed curve, – starting of cage and slip – ring induction motors , speed control and reversal of direction.[10 hrs] Revision problem classes [21 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 محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	107	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	68	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	All
	Assignments	2	10% (10)	2, 12	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	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 - DC machine construction Magnetic Circuit
Week 2	E.M.F. Equation and output equation and commutation-Types of dc generators DC Motor types Dc generators characteristics
Week 3	Test of dc generators DC motor characteristic-Starting of dc motors Speed control.
Week 4	Principle of action E.M.F. equation- leakage reactions
Week 5	Equivalent circuit-voltage regulation and efficiency
Week 6	Open circuit and short circuit tests- Production of rotating magnetic field

Week 7	Synchronous speed and slip-equivalent circuit – torque / speed curve
Week 8	Starting of cage and slip – ring induction motors- speed control and reversal of direction.
Week 9	E.M.F. equation – armature reaction- synchronous impedance voltage regulation – synchronization.
Week 10	starting methods, V curves application of synchronous motors- Semiconductor diodes – Rectifiers
Week 11	Different types of Bridge circuits- Transistors – Power Amplifiers
Week 12	SCRs and their applications. Means of industrial power supply – Factory layouts for distribution and sub.
Week 13	Stations – protection schemes – relays and circuit breakers-Illumination and heating designs
Week 14	Power factor corrections- Measurement of current, voltage and power – recording of energy consumption
Week 15	Voltage divider extension of instrument range
Week 16	A preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to D.C machine
Week 2	Lab 2: Magnetization curve
Week 3	Lab 3: the test of separately-excited D.C. machine.
Week 4	Lab 4: the test of shunt-excited D.C. machine.
Week 5	Lab 5: Test of open and short of induction machine

Week 6	Lab 6: Test of synchronous machine.
Week 7	Lab 7: Transmission line.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Edward Hughes - Hughes electrical and electronic technology [electronic resource]-Pearson Education (2012).pdf	Yes
Recommended Texts	Electrical technology by Hindmarch Electrical Technology by Theraja	Yes No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electricalmachines.	

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.

Semester seven

Semester seven	Design of Machine Elements I	ME411

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Design of Machine Element I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME 411**				
ECTS Credits	**6**				
SWL (hr/sem)	**108**				
Module Level	4		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Jasim Hasan Ilik		**e-mail**	j.h.al-bedhany@uomisan.edu.iq	
Module Leader's Acad. Title	Instructor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ali Husien Hasan		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Theory of Machine I, II and Mechanics of Materials	**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	The student will be able: 1. To analyze Stress and strain and their role in Mechanical design. 2. To learn the theories of mechanical failures. 3. Learn about safety factors, their range and importance. 4. The types of curved beam and analysis of its loadings. 5. How to design and select helical springs. 6. Fatigue stress and how to identify endurance limit. 7. Design and select screws and fasteners. 8. Designing and analyses of pressure vessels (thin and thick cylinders). 9. To understand Computer Aided Design (CAD) and its use in mechanical design.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main outcome is graduate mechanical engineer can design simple machine elements and introduce analyses of their stresses and strains.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	Encourage the students to analyze, design and test some simple .machine elements. A small project of designing a practical simple machine such as press or screw jack to exercise the student treating with the unexpected problems with the design process. The mentioned will be achieved through lectures, tutorials, tests and project.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	4, 13	All
	Assignments	2	10% (10)	7, 14	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative	**Midterm Exam**	2 hr	10% (10)	8	All

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Chapter One: Introduction to Design Process.** • Basics of design process, stress and strains, and strain energy.
Week 2	**Chapter One: Introduction to Design Process.** • Estimating Safety Factors, their importance and ranges.
Week 3	**Chapter Two: Stresses and Strains Analyses.** • Analyses of stresses and strains for curved beams (Tension, Bending and combined).
Week 4	**Chapter Two: Stresses and Strains Analyses.** • Theories of Elastic Failure (Yield stress theory, Maximum stress theory, Maximum shear stress theory, Strain Energy theory. • Quiz.
Week 5	**Chapter Three: Introduction to spring Design.** • Types of springs and stresses induced in them
Week 6	**Chapter Three: Introduction to Spring Design.** • Helical springs. • Spring Index. • Stresses induced in Helical Springs.
Week 7	**Chapter Four: Introduction to Fatigue Failure** • Fatigue stresses, types and importance. • Combination of loading modes.
Week 8	**Chapter Four: Introduction to Fatigue Failure** • Mean and effective stresses of fluctuating loadings. • S-N curve, and how to achieve it.
Week 9	**Chapter Three: Introduction to Fatigue Failure** • Reliability of designed components.

Week 10	**Chapter Five: Introduction to Screw and Fasteners** • Types of screws. • Threads types.
Week 11	**Chapter Five: Introduction to Screw and Fasteners** • Stresses induced in screws and their calculations.
Week 12	**Chapter Five: Introduction to Screw and Fasteners** • Power Screw, types of threads and stresses induced.
Week 13	**Chapter Six: Introduction to Pressure Vessels Design** • Types of pressure vessels (thin and thick). • External and internal force balance. • Quiz.
Week 14	**Chapter Six: Introduction to Pressure Vessels** • Stresses induced due to internal pressure in thin cylinders. • Strains and change in volume.
Week 15	**Chapter Seven: Introduction CAM CAD** • Introduction to Computer Aided Design (CAD).
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Connections of mechanical components.
Week 2	Lab 2: Calculation of stresses for three components in a mechanism.
Week 3	Lab 3: Morphology of failures in mechanical components.
Week 4	Lab 4: Initial and microscopic examinations of failures in mechanical components.
Week 5	Lab 5: Curved beam analyses examples (Lifting Hook and S-type Load cell.
Week 6	Lab 6: Tensile test and Safety of Factors (SFs).

Week 7	Lab 7: Modeling of Mechanical Components.
Week 8	Lab 8: Springs (leaf, torsional and helical springs).
Week 9	Lab 9: Fatigue tests 'reliability and endurance limit.
Week 10	Lab 10: A general view about manufacturing of screws and fasteners.
Week 11	Lab 11: Power Screw (Screw Jack analyses).
Week 12	Lab 12: CAD software and the design processes.
Week 13	Lab 13: Review.
Week 14	Lab 14: Examination.
Week 15	Lab 15: Final examination.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Machine Design by R. K. Jain.	Yes
Recommended Texts	1. Machine Design by Black and Adams. 2. Fundamentals of Mechanical Design by Phelan	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.

Semester seven	Power Plant	ME412

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Power Plant**		**Module Delivery**		
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**		
Module Code	**ME412**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	UG4		**Semester of Delivery**	7	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Ahmed Kadhim Alshara		**e-mail**	dr.ahmed_alshara@uomisan.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Murtadha Saeed Mohammed		**e-mail**	murtadha.saeed@uomisan.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

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

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Graduating engineers specialized in the fields of power plant in line with the progress made in the field of power plants including the clean energy power plant. 2. Providing the labor market with engineers capable to deal with modern power plant. 3. Coordination of work with researchers in power plant as groups to advance the reality of scientific research in this field. 4. Producing projects and applicable research, and marketing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Knowledge and Understanding: • Establishing the basic principles of thermodynamics. • Identifying the types of conventional and non-conventional electric power stations. • Explanation and clarification of modern methods of power stations. • Use of alternative and environmentally friendly stations. 2- Subject-specific skills • The possibility of studying power stations and identifying their parts. • Gaining high confidence in the ability to operate and design power stations.
Indicative Contents المحتويات الإرشادية	The main indicative contents are: **1. General introduction on power plants. [5hr]** Review of the important basics of thermodynamics, fluid mechanics and heat transfer. Definition of the important concepts and classification of power plants, Principle of work of conventional power plants (steam, gas, nuclear, diesel and hydro power plants). Principle of work of the important nonconventional power plants (fuel cells, PV cells, biogas power, geothermal energy, ocean energy, wind energy, wave energy and tidal energy). **2. Conventional power plants (Gas turbine power plants). [10hr]** Types of gas turbine cycles, principle of work**,** advantage and disadvantage of gas

	turbine unit. Thermodynamics and performance analysis of simple gas turbine cycle. Modifications to the basic cycle, Performance analysis of the modified cycle (reheat, regenerative and multi-stage compression with inter-cooling). **3. Conventional power plants (steam turbine power plants). [20hr]** Steam power plant cycles (Carnot cycle, ideal Rankin cycle and actual Rankin cycle). Thermodynamics and performance analysis of simple steam turbine cycle. Modifications to the simple Rankin cycle, Rankin cycle with superheat, the reheat Rankin cycle, The regenerative Rankin cycle, Combined gas steam power plants**.** **4. Steam power plant components (Boilers). [10hr]** Classifications of steam generators, Boiler coils and equipment's and the requirements of good boiler, Principle of work of fire tube, water tube and heat recovery boilers, Boiler calculations and performance. **5. Steam power plant components (condensers). [10hr]** Types of condensers, Elements of the steam condenser, air ejectors and the requirements of an efficient condenser, Steam condenser performance analysis. **6. Steam power components (steam turbine). [15hr]** The impulse steam turbine velocity diagrams, Pressure and velocity compounded impulse steam turbine, The axial - flow reaction turbines, Optimum operating conditions from blade velocity diagrams, Turbine blade height and design. **7. Hydro – power plants. [5hr]** Classification of hydroelectric power plants, water turbine types and advantages and disadvantages of hydro – power plants, Hydro power calculations, Power plants economics**.**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	The main strategies that will be adopted in delivering this unit are: 1- Encourage students to participate in the exercises. This is achieved through classes and interactive educational programmers. 2- Improving and expanding critical thinking skills at the same time and by thinking about the type of simple experiments that include some sampling activities of interest to the students. 3-Raise students scientific and knowledge levels by employing the automatic technique, conversational approach, and active method.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	138	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	9
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

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, 8,9 and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6, 7 and 13
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 11 and 12

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	**Chapter One:General introduction on power plants** Review of the important basics of thermodynamics. fluid mechanics and heat transfer. Definition of the important concepts and classification of power plants.
Week 2	**Chapter Two: Conventional power plants (Gas turbine power plants)** Types of gas turbine cycles, principle of work**.** advantage and disadvantage of gas turbine unit. Thermodynamics and performance analysis of simple gas turbine cycle.
Week 3	**Chapter Two: Conventional power plants (Gas turbine power plants)** Modifications to the basic cycle. Performance analysis of the modified cycle (reheat, regenerative and multi-stage compression with inter-cooling).
Week 4	**Chapter Three: Conventional power plants (steam turbine power plants).** Steam power plant cycles (Carnot cycle, ideal Rankin cycle and actual Rankin cycle).
Week 5	**Chapter Three: Conventional power plants (steam turbine power plants).** Thermodynamics and performance analysis of simple steam turbine cycle. Modifications to the simple Rankin cycle. Rankin cycle with superheat & the reheat Rankin cycle.
Week 6	**Chapter Three: Conventional power plants (steam turbine power plants).** The regenerative Rankin cycle
Week 7	**Chapter Three: Conventional power plants (steam turbine power plants).** Combined gas steam power plants**.**
Week 8	**Chapter Four: Steam power plant components (Boilers)** Classifications of steam generators.

	Boiler coils and equipment's and the requirements of good boiler. Principle of work of fire tube & water tube and heat recovery boilers.
Week 9	**Chapter Four: Steam power plant components (Boilers)** Boiler calculations and performance.
Week 10	**Chapter Five: Steam power plant components (condensers)** Types of condensers. Elements of the steam condenser. air ejectors and the requirements of an efficient condenser.
Week 11	**Chapter Five: Steam power plant components (condensers)** Steam condenser performance analysis.
Week 12	**Chapter six: Steam power components (steam turbine).** The impulse steam turbine velocity diagrams. Pressure and velocity compounded impulse steam turbine.
Week 13	**Chapter six: Steam power components (steam turbine).** The axial - flow reaction turbines. Optimum operating conditions from blade velocity diagrams.
Week 14	**Chapter six: Steam power components (steam turbine).** Turbine blade height and design.
Week 15	**Chapter seven: Hydro – power plants** Classification of hydroelectric power plants. water turbine types and advantages and disadvantages of hydro – power plants. Hydro power calculations. Power plants economics**.**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1&2	Power plant components.
Week 3&4	Evaluate the power plant efficiency however, simulate it using the EES software.
Week 5&6	Evaluate the steam turbine efficiency however, simulate it using the EES software.
Week 7&8	Evaluate the Gas turbine efficiency however, simulate it using the EES software.
Week 9	Examination
Week 10	Nozzles
Week 11	Condenser efficiency however, simulate it using the EES software.
Week 12	Boiler efficiency however, simulate it using the EES software.
Week 13	Review
Week 14	Examination
Week 15	Final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1-Text of lectures 3-Power plant engineering A.K.Raja, Amit Prakash, Manish Dwivedi.	Available
Recommended Texts	1. ENGINEERING THERMODYNAMICS Edited by R.K. RAJPUT Patiala. 2.Heat and Mass Transfer Fundamentals & Applications Yunus A. Çengel & Afshin J. Ghajar, fifth Edition, 2015.	Available

Websites	https://www.coursera.org/browse/physical-science-and-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.

Semester seven	Theory of Vibrations	ME413

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Theory of Vibrations**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME413**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	4		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Mushtaq Abdul Kareem Hussein		**e-mail**	mushtaqkareem@uomisan.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- Know the basic concepts of vibrations. 2- Gain skills to deal with engineering problems and cases related to vibrations. 3- Calculation of the displacement (response) of undamped and damped one-degree-of-freedom systems caused by the initial excitation , harmonic force, periodic load, and an aperiodic load. 4- Finding the equivalents of the components of the mechanical vibration system. 5- How to avoid the occurrence of resonance phenomenon in mechanical systems. 6- How to write equations of motion and find natural frequencies of vibration systems using the energy equation, Newton's second law, and Lagrange's equation. 7- Calculate the normal modes and natural frequencies of two and multiple degree of freedom systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Gain a basic understanding of mechanical vibrations and develop skills in analyzing vibrational systems. 2- Finding the equivalents of the components of the vibration system (stiffness, mass or inertia, and damping). 3- The ability to know the type of motion of a mechanical systems (harmonic or nonharmonic). 4- Using the mechanical vibrations principles like Newton's second law, Lagrange's formula and the conservation energy principle on mathematical models to obtain the equations of motion that govern the vibration systems. 5- The ability to analyze the undamped and damped vibration of single-degree-of-freedom systems. 6- Computing the vibration response of undamped and damped single-degree-of freedom systems harmonically excited.

	7- Finding the vibration response of damped single-degree-of freedom systems subjected to base excitation and rotating unbalance. 8- Predicting the response of undamped and damped single-degree-of freedom systems subjected to periodic loads. 9- Finding the response of undamped and damped single-degree-of freedom systems subjected to general loading functions. 10- Determining the natural frequencies and mode shapes of two and multiple degree-of freedom systems. 11- The ability to reduce the amplitude of vibrations.
Indicative Contents المحتويات الإرشادية	1- An introduction to mechanical vibrations. 2- The equivalent mechanical vibration elements (equivalent stiffness equivalent mass or inertia, and equivalent damping elements). 3- The physical and mathematical concepts of harmonic motion. 4- Free vibration analysis of damped and undamped single-degree-of freedom systems. 5- Response of undamped single-degree-of freedom systems subjected to a harmonic load. 6- Displacement of damped single-degree-of freedom systems subjected to a harmonic load. 7- Beating phenomenon of mechanical systems. 8- Resonance phenomenon of mechanical systems. 9- Response of undamped and damped single-degree-of freedom systems subjected to a periodic load. 10- Response of undamped and damped single-degree-of freedom system subjected to an impulse. 11- Response of undamped and damped single-degree-of freedom systems subjected to general forcing functions. 12- Free vibration analysis of two-degree-of freedom systems. 13- Free vibration analysis of multi-degree-of freedom systems.

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 class training, 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 exercises involving some drawings that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SSWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SSWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured USSWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured USSWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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**	3	15% (15)	5, 10, 15	LO #1- #4, and LO #7- #9 and LO #10- #14
	Assignments	15	15% (15)	Continuous	Continuous
	Report	1	10% (10)	12	LO#3-#9
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #1 - #6
	Final Exam	3 hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	**Introduction :** Fundamentals of Vibrations, Importance of Study of Vibrations, and Basic Concepts.
Week 2	**Classification of vibration :** Classifications according DOF, Classification according to nature, and Classification according to input type.
Week 3	**Free Vibrations:** Free Vibrations of Single Degree of Freedom.
Week 4	**Free Vibrations:** Free Vibrations of Undamped Torsional Systems**.**
Week 5	• **Free Vibrations:** Free Vibrations of systems with Viscous Damping. • **Quiz 1**
Week 6	**Forced Vibrations:** Equation of Motion of Undammed System.
Week 7	• **Forced Vibrations:** Equation of Motion of Damped Systems. • **Midterm Exam**
Week 8	**Forced Vibrations:** Response of Damped system under Harmonic Motion of base.
Week 9	**Forced Vibrations:** Response of Damped system under Rotating Unbalance.
Week 10	• **Vibration Under General Forcing Conditions:** Response under general periodic function. • **Quiz 2**
Week 11	**Vibration Under General Forcing Conditions:** Response under irregular periodic force.
Week 12	• **Vibration Under General Forcing Conditions:** Response under non-periodic force. • **Report**
Week 13	**Multi Degrees of Freedom:** Derivation of Equation of Motion, and Influence coefficients.
Week 14	**Multi Degrees of Freedom:** Lagrange's Equation.
Week 15	• **Multi Degrees of Freedom:** Eigen Value Problem. • **Quiz 3**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Theory of Vibration with Application, William T. Thomson. 2nd Edition • Mechanics of Machines Elementary Theory and Examples, J. H. Hannah and R. C. Stephens. 4th Edition	Yes
Recommended Texts	Mechanical Vibrations, Singiresu S. Rao. 5th Edition.	Yes
Websites	1- https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/pages/mechanical-vibration/ 2- Moodle URL will be provided at the beginning of the course.	

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.

Semester seven	Control	ME414

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Control**		**Module Delivery**		
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**		
Module Code	**ME414**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	7		**Semester of Delivery**	1	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Mahmood Shacker Mahmood		**e-mail**	mahmood-shacker@uomisan.edu.iq	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Iman Mohammed Ismael		**e-mail**	eman.mohamed@uomisan.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Control	**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	The major goal of the course is to develop a specific technical expertise in the analysis and design of Feedback Control Systems. 1. To develop problem solving skills and understanding of control theory through the application of techniques. 2. Understanding the ability to recognize and analyze feedback control mechanisms and design feedback control systems is the key learning outcomes; the principle of feedback is a universal principle behind many processes and devices encountered in Mechanical Engineering as well as electrical, compute, physics, chemical, and biology, etc. 3. To understand mechanical element used in control systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. students will be able to describe feedback control systems in mathematical terms of different equations, transfer functions and statespace

	models, 2. will be able to analyze whether a given control system is stable or not and what needs to be done to make it stable (analysis) 3. how this can/should be done (synthesis) and how your solution will affect the system performance (evaluation). 4. have confidence in solving any problems in the area of control systems within the scope. 5. mastering control systems design tools such as Matlab and Simulink. 6. Define and explain feedback and feed-forward control architecture and discuss the importance of performance, robustness and stability in control design. 7. Interpret and apply block diagram representations of control systems and design PID controllers based on empirical tuning rules. 8. Compute stability of linear systems using the Routh array test and use this to generate control design constraints. 9. Use Evans root locus techniques in control design for real world systems. 10. Compute gain and phase margins from Bode diagrams and Nyquist plots and understand their implications in terms of robust stability

	11. Design Lead-Lag compensators based on frequency data for an open-loop linear system. 12. Understand and finding the controllability and the observability of the control systems.
Indicative Contents المحتويات الإرشادية	1. Introduction to Control Systems (12hr) 2. Mathematical Models (12hr) 3. Block Diagrams (12hr) 4. State Variable Representation(12hr) 5. Feedback System Characteristics(12hr) 6. Performance of Feedback Systems(12hr) 7. Stability of Linear Feedback Systems(12hr) 8. Root Locus Method(22hr) 9. Frequency Response Methods(22hr)

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 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	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	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	All
	Assignments	2	10% (10)	2, 12	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	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 math review (Chapter 1)**
Week 2	**Introduction and math review (Chapter 1)**
Week 3	**Physical system modeling (Chapter 2)**
Week 4	**Physical system modeling (Chapter 2)**
Week 5	**System responses (Chapter 4)**
Week 6	**System responses (Chapter 4)**
Week 7	**Control system characteristics & its stability analysis (Chapters 5 & 6)**
Week 8	**Control system characteristics & its stability analysis (Chapters 5 & 6)**
Week 9	**Root Locus (Chapter 7)**
Week 10	**Root Locus (Chapter 7)**
Week 11	**Frequency domain analysis (Chapter 8)**
Week 12	**Frequency domain analysis (Chapter 8)**
Week 13	**Frequency domain synthesis (Chapter 9)**
Week 14	**Frequency domain synthesis (Chapter 9)**
Week 15	**Preparatory week before the final Exam**
Week 16	**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	Modern Control Engineering by Katsuhiko Ogata Frank P. Incropera, David P. Dewitt, Seventh Edition, 2011.	Yes
Recommended Texts	1- Principles of control systems by S.P.Eugene 2- Linear control systems with MATLAB applications by B.S. Manke	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.

Semester seven	Engineering Materials	ME415

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Materials**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME415**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Dr. Mohammed Razzaq Mohammed		**e-mail**	mohammedrazzaq14@uomisan.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	17/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ME225	**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	After completing this course, students should be able to do the following: • Name different types of engineering materials. • Name various types of steels and cite compositional differences, distinctive properties, and typical uses for each. • Name the five cast iron types and describe the microstructure and note the general mechanical characteristics for each. • Name different types of nonferrous alloys and cite the distinctive physical and mechanical characteristics. • State the purposes of and describe procedures for the following heat treatments: process annealing, normalizing, and full annealing. • Describe a typical polymer molecule in terms of its chain structure and, in addition, how the molecule may be generated from repeat units. • Name and briefly describe the four general types of polymer molecular structures, and the four types of copolymers. • Cite the differences in behavior and molecular structure for thermoplastic and thermosetting polymers. • Describe the process that is used to produce glass–ceramics. • Name the types of clay products and forms of carbon. • Cite three important requirements that normally must be met by refractory ceramics, abrasive ceramics and cement. • Name and briefly describe some forming methods that are used to fabricate glass pieces. • Describe the mechanism of crack propagation for both ductile and brittle modes of fracture. • Define fracture toughness and make a distinction between fracture toughness and plane strain fracture toughness. • Define fatigue and specify the conditions under which it occurs. • Define creep and specify the conditions under which it occurs, and determine the steady-state creep rate and the rupture lifetime. • Distinguish between oxidation and reduction electrochemical reactions and explain forms of corrosion and corrosion prevention.
Module Learning	The main outcome is that graduate mechanical engineer can deal with methods,

Outcomes مخرجات التعلم للمادة الدراسية	applications, problems, calculations and design related to engineering materials.
Indicative Contents المحتويات الإرشادية	

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	15% (15)	5, 10	All
	Assignments	2	15% (15)	2, 12	All
	Projects	1	10% (10)	Continuous	All
	Report/lab				
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Chapter one: Ferrous Metals** Carbon steels, Low alloy steels.
Week 2	**Chapter one: Ferrous Metals** Heat treatments of carbon steels, Stainless steels, Cast irons.
Week 3	**Chapter Two: Non-Ferrous Metals** Copper, Brasses, Bronzes, Copper- nickel.
Week 4	**Chapter Two: Non-Ferrous Metals** Aluminum, Wrought aluminum alloys, Cast aluminum alloys, Precipitation hardening process.
Week 5	**Chapter Three: Polymers**

	Molecular structure of polymers, Addition and condensation polymerization, Degree of polymerization.
Week 6	**Chapter Three: Polymers** Thermoplastics and Thermosets, Mechanical behavior of polymers.
Week 7	**Chapter Four: Ceramics** Crystal Structures, Silicate Ceramics, Carbon, Imperfections in Ceramics, Diffusion in Ionic Materials,
Week 8	**Chapter Four: Ceramics** Glasses and Glass–Ceramics, Clay Products, Refractories, Abrasives, Cements, Advanced Ceramics.
Week 9	**Chapter Five: Composites** Large-Particle Composites, Dispersion-Strengthened Composites, Influence of Fiber Length, Orientation and Concentration.
Week 10	**Chapter Five: Composites** The Fiber Phase, the Matrix Phase, Polymer-Matrix Composites, Metal-Matrix Composites, Ceramic-Matrix Composites, Laminar Composites, Sandwich Panels.
Week 11	Chapter Six: Mechanical Properties of Materials Elastic Deformation, Stress-Strain Behavior, Elastic Properties of Materials, Tensile Properties, True Stress and Strain, Hardness.
Week 12	**Chapter Six: Fracture** Fundamentals of Fracture, Ductile Fracture, Brittle Fracture, Principles of Fracture Mechanics, Impact Fracture Testing.
Week 13	**Chapter Seven: Fatigue** Cyclic Stresses, the *S*–*N* Curve, Crack Initiation and Propagation.
Week 14	**Chapter Eight: Creep** Generalized Creep Behavior, Stress and Temperature Effects, Data Extrapolation Methods (Larson- Miller Methods), Alloys for High-Temperature Use.
Week 15	**Chapter Nine: Corrosion**

	Electrochemical Considerations, Forms of Corrosion, Corrosion Prevention.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Materials Science and Engineering an Introduction, William D. Callister, JR. and David G. Rethwisch.	No
Recommended Texts	Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, Mikell P. Groover.	No
	Manufacturing Processes, H.N. Gupta, R.C. Gupta, and Arun Mittal.	No
Websites		

Grading Scheme

مخطط الدرجات

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

Semester seven	**Engineering Project**	**ME416**

Semester eight

Semester eight	Design of Machine Elements II	ME421

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Design of Machine Element II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME 421**				
ECTS Credits	**5**				
SWL (hr/sem)	**62**				
Module Level	4		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Jasim Hasan Ilik		**e-mail**	j.h.al-bedhany@uomisan.edu.iq	
Module Leader's Acad. Title	Instructor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ali Husien Hasan		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Theory of Machine I, II and Mechanics of Materials	**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	The students should be able to: 1. Understand gear types and design and analysis of contact forces. 2. Analysis and selection of Rolling Contact Bearings. 3. Design and analyses of Journal Bearings. 4. Design and analyses of shafts, their loadings, from the view points of bending, torsion and fatigue. 5. Design, analysis and selection of different belt drive systems. 6. Analyses of different joints (rivets and welding joints). 7. The principals of analyzing clutches, brakes and flexible joints (coupling).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main outcome is graduate mechanical engineer can design main components of machines and introduce analyses of their stresses and strains.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	Encourage the students to analyze, design simple .machine elements. The mentioned will be achieved through lectures, tutorials, tests and a project assignment.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	62	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	63	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Chapter One: Introduction to Gear design.** • Basics information of gear design process and stress calculation.
Week 2	**Chapter One: Introduction to Gear Design.** • Analyses of Spur and helical and worm gears.
Week 3	**Chapter One: Introduction to Gear Design.** • Selection of gears, No. of teeth and module.
Week 4	**Chapter One: Introduction to Gear Design.** • Bending stress in gears and introduction to Hertz contact theory.
Week 5	**Chapter Two: Introduction to Bearing Design.** • Types of bearings and their loadings, contact stress on the inner and outer rings. • Quiz.
Week 6	**Chapter Two: Introduction to Bearing Design.** • Bearing rating load, dynamic load and rating life. • Reliability of bearings and its relation with the life prediction. • Selecting of bearings and the use of standards.
Week 7	**Chapter Three: Introduction to Journal Bearings** • Hydro-static and Hydro-dynamic lubricating systems. Lubricant viscosity and other considerations.
Week 8	**Chapter Three: Introduction to Journal Bearings** • Journal bearing design and dimensions.
Week 9	**Chapter Four: Introduction to Shaft' Design** • Shaft type and supporting, shaft' materials, bending and torsion stresses on shafts.
Week 10	**Chapter Four: Introduction to Shaft' Design** • Design of shafts from the bending, torsion and fatigue point of views. • Key and Keyways of shafts. • Quiz.

Week 11	**Chapter Five: Introduction to Belt Driving Systems** • Analysis of Flat Belt (open and cross driving systems). • Tensions, Lap angles, initial tension to transmit maximum power.
Week 12	**Chapter Five: Introduction to Belt Driving Systems** • V-Belt and ropes analyses and selection.
Week 13	**Chapter Six: Introduction to Welding and Rivets** • Types of welding fillet joints. • Welding joint analysis.
Week 14	**Chapter Six: Introduction to welding and Rivets** • Riveting analyses of Butt and Lap joints.
Week 15	**Chapter Seven: Introduction CAM CAD** • Introduction to Computer Aided Design.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Machine Design by R. K. Jain.	Yes
Recommended Texts	1. Theory of Machines by Khurmi. 2. Fundamentals of Mechanical Design by Phelan	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.

Semester eight	Air Conditioning and Refrigeration	ME422

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Air Conditioning and Refrigeration**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME422**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level		2	**Semester of Delivery**		2
Administering Department		Mechanical	**College**	Engineering College	
Module Leader	Ali Hussein Jabbar Al-Jubainawi		**e-mail**	alihussein.mcm@uomisan.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Scientific Committee Approval Date		3/07/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	- Thermodynamics I - Thermodynamics II	**Semester**	1 2
Co-requisites module		**Semester**	

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

Module Aims أهداف المادة الدراسية	The module aims are: 11. Preparing engineers for meeting the labor market needs of private and public sectors in the mechanical engineering field through diversifying the methods of learning, teaching, and training for the students. 12. Providing academic programs in the field of mechanical engineering, both theoretical and practical, according to the international standards of academic quality and the needs of the labor market. 13. Encouraging and developing scientific research in the fields of mechanical engineering in the fields of air conditioning and thermal performance of buildings. 14. Preparing a suitable environment for faculty members to develop their knowledge and research skills. To develop some elementary analysis skills using the first and second laws of thermodynamics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. The ability to design air conditioning systems. 2. The ability to think about addressing the problems of the large heat gain in buildings during the summer. 3. The ability to deal with modern software for cooling load calculations and designing air duct systems and chilled or hot water pipes in central air conditioning systems.
Indicative Contents المحتويات الإرشادية	The main indicative contents are: Part A – Air conditioning Introduction of moist air properties, Relative humidity, moisture content, Relative humidity, moisture content, Air conditioning processes, and psychometric chart, Sensible and latent heat, Humidification, and dehumidification of air, Adiabatic mixing, and adiabatic saturation, Summer air conditioning systems, Cooling load estimation, Steady state heat conduction in buildings, Unsteady state heat conduction in buildings, Cooling load items, examples and applications, Heating load estimation, Duct design, [80 hrs.] Part B – Refrigeration System of air conditioning, Pipe system design, Chillers, Refrigeration, Vapor compression refrigeration system, Carnot refrigeration cycle, Ideal refrigeration cycle, Real vapor compression refrigeration cycle, Absorption refrigeration system, Steam jet refrigeration, Air cycle refrigeration, Cold storage. [40 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategies that will be adopted in delivering this unit are: 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	138	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	9.1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction of moist air properties**
Week 2	**Air conditioning processes and psychometric chart**
Week 3	**Summer air conditioning systems**
Week 4	**Cooling load estimation**

Week 5	**Heat conduction in buildings**
Week 6	**Cooling load items, examples, and applications**
Week 7	**Heating load estimation**
Week 8	**Ducts design**
Week 9	**Systems of air conditioning**
Week 10	**Pipes system design**
Week 11	**Ideal refrigeration cycles**
Week 12	**Vapor compression refrigeration cycle**
Week 13	**Absorption refrigeration system**
Week 14	**Steam jet and Air refrigeration cycles**
Week 15	**Unconventional refrigeration system and cold storage**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to moist air properties
Week 2	Lab 2: Introduction to moist air properties
Week 3	Lab 3: Psychometric processes
Week 4	Lab 4: Psychometric processes
Week 5	Lab 5: Cooling and dehumidification
Week 6	Lab 6: Cooling and dehumidification
Week 7	Lab 7: Heating and humidification
Week 8	Lab 8: Heating and humidification
Week 9	Lab 9: Vapor compression refrigeration system
Week 10	Lab 10: Vapor compression refrigeration system
Week 11	Lab 11: Heat pump
Week 12	Lab 12: Heat pump
Week 13	Lab 13: Review
Week 14	Lab 14: Examination
Week 15	Lab 15: Final examination

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	7. Text of lectures. 8. Jones, W.P., 2007. Air conditioning engineering. Routledge.	Yes
Recommended Texts	5. Wang, S.K. and Wang, S.K., 2000. Handbook of air conditioning and refrigeration (Vol. 49). New York: McGraw-Hill.	yes

Grading Scheme
مخطط الدرجات

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

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

Semester eight	Vibration Applications	ME423

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Vibrations Applications**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ME423**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Mushtaq Abdul Kareem Hussein		**e-mail**	mushtaqkareem@uomisan.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Jasim Hasan Ilik AL-Bedhany		**e-mail**	j.h.al-bedhany@uomisan.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Theory of Vibrations	**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.** The ability to use laboratory equipment correctly to obtain the best results. **2.** Know how to measure the characteristics of vibrations of the mechanical systems and interpret the results. **3.** Analyze and perform mathematical formulations of real-world mechanical vibration problems. **4.** How to compute the natural frequencies and mode shapes of transverse vibration of strings and rods. **5.** Measure and control of vibration and noise.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1.** How to apply the basic principles gained from understanding the theory of vibrations. **2.** Acquisition of skills in dealing with engineering problems and issues related to vibrations. **3.** Gain a basic understanding of how vibrations occur in various industrial applications. **4.** Ability to perform vibration analysis for strings. **5.** The ability to analyze and process the vibration of beams. **6.** The ability to reduce the amplitude of vibrations.
Indicative Contents المحتويات الإرشادية	**Theoretical part :** **1.** Basic principles gained from understanding the theory of vibrations in the first semester. **2.** Determination of natural frequency and modal shapes using Dunkerley formula , Rayleigh's method, and Holzer's method. **3.** Continuous Systems: Transverse vibration of string, longitudinal vibrations of rod, and torsional vibrations of shafts and rods.

	4. Vibration Control : Balancing of rotating machines, whirling of rotating shafts, vibration isolation , and control of natural Frequencies. **5.** Vibration Measurements: Vibration pickups, vibration exciters, and signal analysis. **practical part :** Includes conducting the following experiments: 1. Single degree of freedom system (simple pendulum). 2. Single degree of freedom system (mass- spring system). 3. Torsional vibration systems. 4. Forced vibration systems. 5. Two degree of freedom torsional vibration. 6. Whirling of shafts.

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 class training, 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 exercises involving some drawings that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SSWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SSWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured USSWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured USSWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	5, 11, 15	LO #1- #4,LO #7- #10, and LO #11- #14
	Assignments	15	10% (10)	Continuous	Continuous
	Report	6	15% (15)	4,6,8,10,13, 15	LO #2- #3, LO #4- #5, LO #6- #7, LO #8- #9, LO #10- #12, and LO #13- #14
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #1 - #6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1-4	**Determination of Natural Frequency and Modal Shapes** Dunkerley Formula , Holzer's Method, and Rayleigh's Method.
Week 5	**Continuous Systems** • Introduction, and Transverse Vibration of String. • **Quiz 1**
Week 6	**Continuous Systems** Longitudinal Vibrations of rod.
Week 7-8	**Continuous Systems** • Torsional Vibrations of Shafts and Rods. • **Midterm Exam**
Week 9	**Vibration Control** Balancing of Rotating Machines.
Week 10	**Vibration Control** Whirling of rotating Shafts.
Week 11	**Vibration Control** • Vibration Isolation. • **Quiz 2**
Week 12	**Vibration Control** Control of Natural Frequencies.
Week 13	**Vibration Measurements** Vibration Pickups.
Week 14	**Vibration Measurements** Vibration Exciters.
Week 15	**Vibration Measurements** Signal Analysis and **Quiz 3**

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

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	Lab 1: General introduction to the Lab.
Week 2-3	Lab 2: Single Degree of Freedom system (simple pendulum).
Week 4-5	Lab 3: Single Degree of Freedom system (mass- spring system).
Week 6-7	Lab 4: Torsional Vibration Systems.
Week 8-9	Lab 5: Forced Vibration Systems.
Week 10-12	Lab 6: Two Degree of Freedom Torsional Vibration.
Week 13-15	Lab 7: Whirling of Shafts

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Theory of Vibration with Application, William T. Thomson. 2nd Edition • Mechanics of Machines Elementary Theory and Examples, J. H. Hannah and R. C. Stephens. 4th Edition • Kelly, S. Graham, "Mechanical Vibrations: Theory and Applications", SI Edition, Cengage Learning, 2011.	Yes
Recommended Texts	Mechanical Vibrations, Singiresu S. Rao. 5th Edition.	Yes
Websites	3- https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-	

	2011/pages/mechanical-vibration/ 4- Moodle URL will be provided at the beginning of the course.

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
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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.

Semester eight	Measurements	ME424

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Measurements**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME424**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Mahmood Shacker Mahmood		**e-mail**	mahmood-shacker@uomisan.edu.iq	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Alijasim Albhadly		**e-mail**	Ali_jassim@ uomisan.edu.iq	
Scientific Committee Approval Date	10/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Measurements	**Semester**	8

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 covers the basic use and application of sensors, transducers, mechanical and electronic measuring instruments. The theory of analogue DC and AC measuring instruments is first established which is then used to study analog electronic and digital meters. Different types of sensors and transducer are studied with their analog and digital interfacing. The use and application of different measuring instruments are also covered.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Describe mathematically and physically the designed measuring instruments and their use for measurements. 2- Express the integration of transducers with analog and digital hardware and use of software to achieve required output for measurement system. 3- Analyze the design of instruments and measurement of parameters using instruments. 4- Design a variety of electronic instruments and measuring systems used in different fields. 5- Use various mechanical and electrical measurements devices in field.
Indicative Contents المحتويات الإرشادية	

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

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

Student Workload (SWL) الحمل الدراسي للطالب 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
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Fundamentals of Measurement Systems** Measurement Systems, Signals, Automatic Measurements, Specification Terms.
Week 2	**Instrument Types and Performance Characteristics**
Week 3	**Display, Recording, and Presentation of Measurement Data**
Week 4	**Measurement Errors** Sources of Error, Random And Systematic Errors, The Mean
Week 5	**Measurement Errors** Value And Its Error, Combining Errors, Overall Instrument Error.
Week 6	**Modeling Measurement Systems** Zero-Order Elements, First-Order Elements
Week 7	**Modeling Measurement Systems** Second-Order Elements, Transfer Function, Frequency Response.
Week 8	**Sensors** Classification Of Sensors, Resistive Sensors, Capacitive Sensors, Piezoelectric Sensors, Photovoltaic Sensors.
Week 9	**Sensors** **Inductive Sensors, Electromagnetic Sensors , Thermoelectric Sensors, Elastic Sensors**
Week 10	**Signal Conditioning And Processing** ance To Voltage Conversion, Operation Amplifiers, Noise, Filters, Modulation, Analogue And Digital Conversions, Interfacing.
Week 11	**Force, Torque, and Pressure** • Force Measurement, Torque Measurement, Pressure Measurement, Strain Measurement.
Week 12	• **Flow Measurement**

Week 13	• **Temperature Measurement**
Week 14	• **Strain Measurement**
Week 15	• **Position and Motion Measurement** • Linear Displacement Measurement, Angular Displacement Measurement, Measurement of Velocity, Accelerometers.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Fundamentals of Measurement Systems and instrument types
Week 2	Lab 1: Measurement Uncertainty
Week 3	Lab 2: Calibration
Week 4	Lab 3: Display, Recording, and Presentation of Measurement Data
Week 5	Lab 4: Mass, Force, and Torque Measurement
Week 6	Lab 5: Mass, Force, and Torque Measurement
Week 7	Lab 6: Temperature Measurement
Week 8	Lab 7: Temperature Measurement
Week 9	Lab 8: Pressure Measurement
Week 10	Lab 9: Flow Measurement
Week 11	Lab 10: Strain gauge
Week 12	Lab 11: Strain gauge
Week 13	Lab 12:Vibration, and Shock Measurement
Week 14	Lab 13:Vibration, and Shock Measurement

Week 15	Lab 15:Final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Theory and Design for Mechanical Measurements Fifth Edition Richard S. Figliola Clemson University Donald E. Beasley Clemson University	Yes
Recommended Texts	Measurement and Instrumentation Systems, First published 1996. W. Bolton 1996.	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.

Semester eight	Industrial Engineering	ME425

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Industrial Engineering and Management**			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ME425**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	2	
Administering Department	Mech. Department		**College**	Engineering College	
Module Leader	Firas Lattef Hussany		**e-mail**	firaslattef@uomisan.edu.iq	
Module Leader's Acad. Title	Assist. Lect.		**Module Leader's Qualification**	Master	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/06/2023		**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 module aims are: 1. Develop knowledge of industrial engineering principles. 2. Foster an understanding of project management principles. 3. Enhance problem-solving and analytical skills. 4. Develop critical thinking and decision-making abilities. 5. Cultivate effective communication and teamwork skills. 6. Promote ethical and sustainable practices.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The main module learning outcomes are: 1. Apply industrial engineering principles to optimize processes and systems for enhanced productivity and efficiency. 2. Utilize project management techniques to plan, execute, and monitor projects effectively, meeting specified goals and deadlines. 3. Analyze and improve work design to enhance employee productivity, satisfaction, and safety. 4. Implement quality management techniques to ensure high standards and continuous improvement. 5. Employ operations research methods to solve complex problems and make data-driven decisions. 6. Demonstrate proficiency in supply chain management, optimizing the flow

	of goods and resources. 7. Utilize facility layout strategies to optimize space utilization and streamline operations. 8. Evaluate and mitigate risks associated with projects, ensuring successful project completion. 9. Estimate project costs accurately, manage budgets, and monitor financial performance. 10. Demonstrate effective communication, leadership, and teamwork skills in industrial and project management settings.
Indicative Contents المحتويات الإرشادية	**<u>Part A – Industrial Engineering</u>** Operation research Maintenance Engineering Fundamentals of Control: INVENTORY MANAGEMENT AND CONTROL Fundamentals of Control: INVENTORY MANAGEMENT AND CONTROL Break Even Analysis Sequencing Introduction to Transportation Problem Introduction to Transportation Problem Assignment Problem Assignment Problem Games with Mixed Strategies Introduction to Linear Programming Introduction to Linear Programming

	Part B – Project Management Fundamentals Project Initiations Planning Activity Networks Activity Networks- -examples Project Resource Analysis Project Resource Analysis examples SOLVED PROBLEMS Risk Management Risk Management examples NPV NPV EXAMPLES COST MANAGMNET Cost management examples

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The strategies employed in the Industrial Engineering and Management module focus on promoting active student participation and cultivating critical thinking skills. This is achieved through interactive classes, engaging tutorials, and the inclusion of practical experiments. The module incorporates sampling activities that are designed to captivate students' interest and align with the principles of industrial engineering and project management. By encouraging participation and hands-on learning, students

	develop their analytical abilities and gain a deeper understanding of the subject matter. These strategies create an engaging and dynamic learning environment that prepares students for real-world challenges in the field of industrial engineering and project management.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (10)	5, 10	LO # 1, 2, 8,9 and 10
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6, 7 and 13
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	LO # 5, 11 and 12
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. Operation research
Week 2	Maintenance Engineering, Fundamentals of Control: INVENTORY MANAGEMENT AND CONTROL
Week 3	Fundamentals of Control: INVENTORY MANAGEMENT AND CONTROL, Break Even Analysis
Week 4	Sequencing, Introduction to Transportation Problem
Week 5	Introduction to Transportation Problem, Assignment Problem
Week 6	Assignment Problem, Games with Mixed Strategies
Week 7	Introduction to Linear Programming, Introduction to Linear Programming
Week 8	Introduction to project Management , Project Initiations
Week 9	Planning, Activity Networks
Week 10	Activity Networks- -examples, Project Resource Analysis
Week 11	Project Resource Analysis examples, SOLVED PROBLEMS
Week 12	Risk Management, Risk Management examples
Week 13	NPV, NPV EXAMPLES
Week 14	COST MANAGMNET, Cost management examples
Week 15	Solved problems
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Lectures for Industrial Engineering and Management.	Yes
Recommended Texts		yes
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
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